

ROADS AND STREETS

MAY, 1942

Feather River Canyon Highway,
Plumas County, between Storrie
and Belden, California

► **Adams Equipment
Grades the Grounds
to Build the Plants
that Make the**

WAR SUPPLIES



THE MAMMOTH JOB of supplying our huge new army and growing navy is necessitating the erection of hundreds of new plants all over the nation for the production of powder, shells, bombs, guns, tanks, planes and hundreds of other necessities. Many of these projects include large acreage of land . . . On scores of such projects it has fallen to the lot of Adams equipment—motor graders, hauling scrapers, leaning wheel graders—to convert rolling fields into suitable building sites, to build roads, grade parking areas, etc. This is not difficult work but it must be done quickly and on schedule. Adams equipment—easy to operate and dependable in performance—enables contractors to keep ahead of schedule and do the work at proper cost . . . Whatever your road-building or earth-moving problems on war projects, see your local Adams dealer about any needed equipment. He can help you.

J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA
Sales and Service Throughout the World



ABOVE: Adams motor graders grading around new war production plants in the east. **BELOW:** Adams hauling scraper leveling ground for new arms plant in middle west.

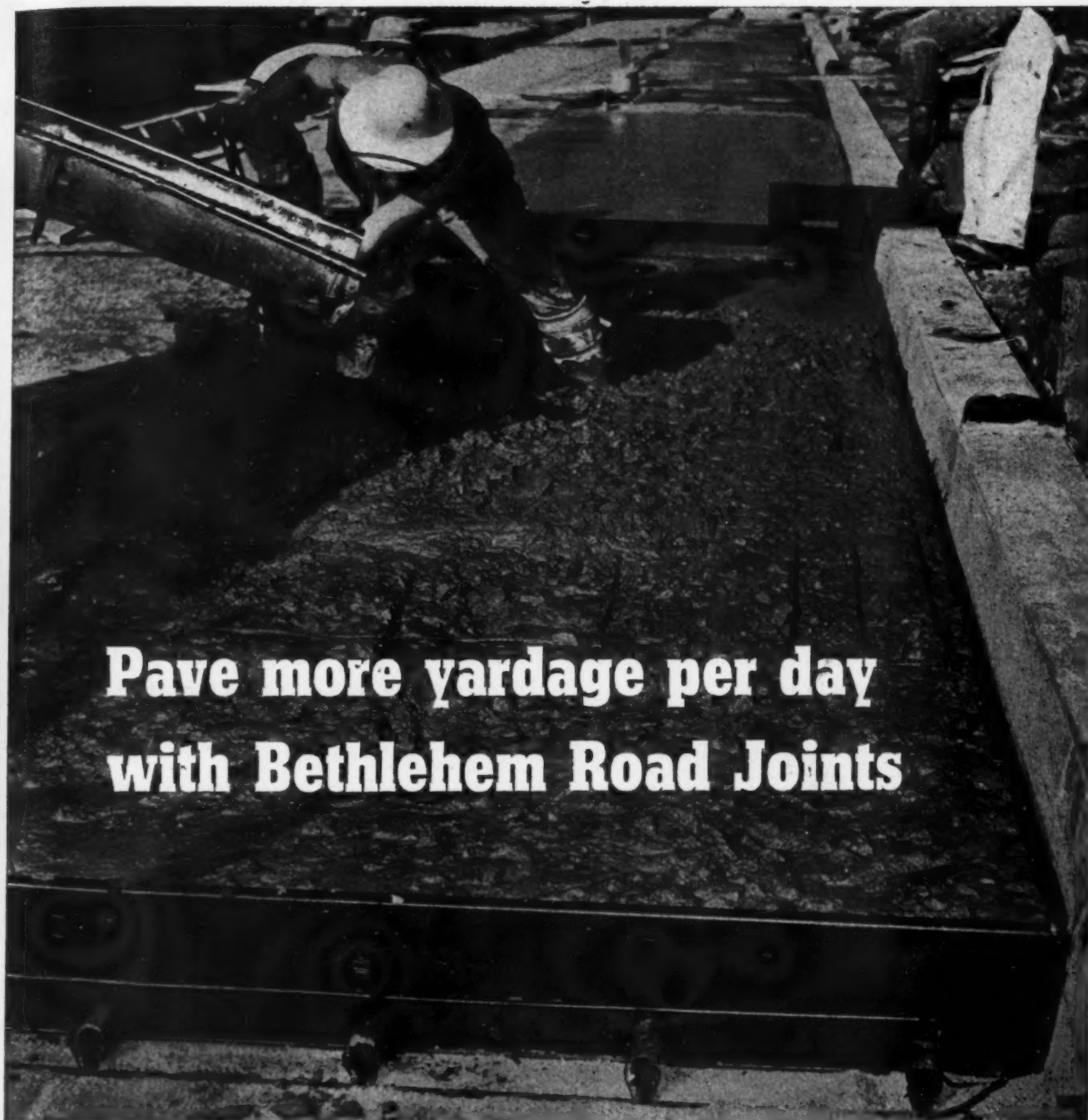


USE THESE ADAMS MACHINES—Motor Graders in six models, Leaning Wheel Graders, Elevating Graders, Hauling Scrapers, Tamping Rollers, etc.

ON THESE DEFENSE JOBS—Airfields, camps, defense building sites, ammunition dumps, access roads, etc.

ADAMS

**ROAD-BUILDING AND
EARTH-MOVING EQUIPMENT**



Pave more yardage per day with Bethlehem Road Joints

Note how the Bethlehem Road Joint stays upright during pouring. It easily resists the vibration of the finishing machine, too. Both Bethlehem Road Joints and Bar Mats were used on this job, in Pennsylvania.

With a large volume of highway construction essential to the war effort, many contractors have road-building jobs on which every day that can be saved is vital.

The use of Bethlehem Road Joints will help you to pave more yardage per day. With these joints, you don't have to waste precious time locating parts, fitting them together into one unit, and then adjusting them. You get Bethlehem Road Joints all in one piece, completely shop-fabricated. Even the dowels are in position. All

you need do is fit on the filler, place the joint—one man can do it—and with a few blows drive the pins through the dowels, thus anchoring it in place, ready for pouring.

Still another advantage of Bethlehem Road Joints when minutes count: They are so sturdily built that they won't tip over when concrete is poured against them, or when the finishing machine passes over them.

The nearest Bethlehem district office can give you the facts on Bethlehem Road Joints. Write or phone today.

BETHLEHEM STEEL COMPANY



ROADS AND STREETS, May, 1942

ROADS AND STREETS

Vol. 85, No. 5

May, 1942

CONTENTS

Importance of Maintenance to Low-Cost Roads.....	23
By BEN H. PETTY Professor of Highway Engineering, Purdue University	
Force Account Concrete Pavement Widening Project.....	28
Design of Highway Sections for War and Post-War Needs.....	31
By WILBUR H. SIMONSON Senior Landscape Architect, Public Works Administration, Federal Works Agency	
Decrease in Trend of Traffic Volume Indicated.....	37
Observations by the Way.....	40
Wet Subgrades Their Cause and Cure.....	42
By H. E. COTTON Drainage Engineer, Armco Drainage Products Association	
Savings Will Assure Victory.....	52
By HENRY MORGENTHAU, JR. Secretary of the Treasury of the United States	
Traffic Segregation Design "Keeps Them Rolling".....	54
More "Straw Votes" for Victory.....	60
Editorial	62
How to Secure Certificate of Necessity for Bituminous Materials.	64
Equipment Rental Prices Issued by O P A.....	66
About Contractors and Their Jobs.....	70
New Equipment and Materials.....	73
With the Manufacturers.....	76
New Trade Literature.....	79

Published by Gillette Publishing Co. Acceptance under the Act of June 5, 1934, authorized January 25, 1938, at Chicago, Illinois. Subscription price \$3.00 per year in the United States, \$3.60 per year in Canada, \$4.00 per year for foreign mailing.

ROADS AND STREETS

CCA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE
BEEN COMBINED GOOD ROADS
MAGAZINE AND ENGINEERING &
CONTRACTING

STAFF

HALBERT P. GILLETTE, *Editor*
EDWARD S. GILLETTE,
Publisher
VICTOR J. BROWN
Publishing Director
CHARLES T. MURRAY,
Managing Editor
JOHN C. BLACK, *Field Editor*
DOROTHY LEDGERWOOD
Advertising Editor

GILLETTE PUBLISHING COMPANY

330 S. Wells St., Chicago, Ill.
ESTABLISHED 1866

Publishers of

ROADS AND STREETS
POWERS' ROAD AND
STREET CATALOG
WATER WORKS AND
SEWERAGE
CAMINOS Y CALLES
TECHNICAL BOOKS

BUSINESS REPRESENTATIVES

Chicago Office

E. C. KELLY
E. H. HICKEY
L. H. LINGNOR
330 S. Wells St., Chicago, Ill.
Telephone: Harrison 1843

New York Office

J. M. ANGELL, JR.
A. E. FOUNTAIN
155 East 44th St., New York, N. Y.
Telephone: MURrayhill 3-6023

Cleveland Office

B. C. BRUMM
2025 Lakeland Ave., Lakewood, Ohio
Telephone: Lakewood 4466

San Francisco Office

DON HARWAY & CO.
420 Market St., San Francisco, Cal.
Telephone: EXbrook 6029

AVOIDS TRANSPORTATION PROBLEMS

KEEPS CONTROL OF JOB IN YOUR HANDS

SAVES COSTLY PENALTIES

DELIVERS A MORE SATISFACTORY ROAD

INSURES FULL PROFIT ON JOB

INSURES ON-TIME COMPLETION OF JOB

How to be sure you'll finish that road construction job "ON TIME!"

LINCOLN-ITE ENABLES YOU TO USE LOCAL AGGREGATE...AVOID LONG AND UNCERTAIN FREIGHT HAULS . . . COSTLY PENALTIES

You know what you're up against, today, in getting quick, long-haul truck or freight deliveries. So do highway engineers and city officials. And they want that job done on time as much as *you* do. That's why more and more specifications are calling for Lincoln-ite . . . the Pulverized Dry Petroleum Asphalt that permits the use of *local* straight-line aggregate. Result: More durable roads, self-renewing non-skid surfaces, lower up-keep costs, important initial savings . . . and *on-time* delivery. Get the facts. Write today.

THE OHIO OIL COMPANY, INC.

PRODUCERS OF PETROLEUM

SINCE 1887

ASPHALT DIVISION, ROBINSON, ILL.



COUNT THE ADVANTAGES LINCOLN-ITE GIVES YOU—

1. Greater uniformity—controlled mix.
2. Utilizes local aggregate and equipment.
3. Self-renewing non-skid surfaces.
4. Greater stability and durability.
5. Adapts itself to base movements.
6. Lower maintenance cost.
7. Can be used for lowest-cost to highest-type construction.
8. Tested and proved.

LINCOLN-ITE
PULVERIZED DRY PETROLEUM ASPHALT

ROADS AND STREETS, May, 1942

To Save Vital

BLAW-KNOX PRE TO THE CONSTRUCTION

THIS NATIONALLY KNOWN DISTRIBUTING
ORGANIZATION WILL MAKE THE PLAN EFFECTIVE

ALABAMA
Birmingham.....Young & Vann Supply Company

ARIZONA
Phoenix.....State Tractor Equipment Company

ARKANSAS
Little Rock.....Lyons Machinery Company

CALIFORNIA
Los Angeles.....LeRoi-Rix Machinery Company
Los Angeles.....E. M. Ornitz
San Francisco.....C. H. Grant Company

COLORADO
Denver.....Ray Corson Machinery Company

CONNECTICUT
New Haven.....The W. I. Clark Company

DELAWARE
Baltimore, Md.....Henry H. Meyer Company, Inc.

DISTRICT OF COLUMBIA
Washington.....Matt A. Doetsch Machinery Company

FLORIDA
Jacksonville.....Quinn R. Barton, Inc.
Marianna.....Berry & Brown, Inc.
Miami.....East Coast Equipment Company, Inc.
Tampa.....Epperson & Company

GEORGIA
Atlanta.....W. C. Caye & Company

IDAHO
Boise.....Intermountain Equipment Company

ILLINOIS
Chicago.....O. T. Christerson Company
St. Louis, Mo.....O. B. Avery Company

INDIANA
Indianapolis.....Reid-Holcomb Company

IOWA
Davenport.....Gierke-Robinson Company
Des Moines.....Herman M. Brown Company

KANSAS
Kansas City, Mo.....G. W. Van Keppel Company

KENTUCKY
Louisville.....Brandeis Machinery & Supply Company

LOUISIANA
New Orleans.....Southern States Equipment Company

MAINE
Portland.....Stanley & Cadigan Company

MARYLAND
Baltimore.....Henry H. Meyer Company, Inc.

MASSACHUSETTS
Boston.....The Equipment Company
New Haven, Conn.....The W. I. Clark Company

MICHIGAN
Detroit.....Wm. P. Favorite Company
Grand Rapids.....Contractors Machinery Company
Iron Mountain.....Service & Supply Division

MINNESOTA
St. Paul.....Borchert-Ingersoll Company

MISSISSIPPI
Amory.....Dalrymple Equipment Company

MISSOURI
Kansas City.....G. W. Van Keppel Company
St. Louis.....O. B. Avery Company

MONTANA
Billings.....Western Construction Equipment Company

NEBRASKA
Omaha.....Anderson Equipment Company

NEVADA
Los Angeles, Calif.....E. M. Ornitz
San Francisco, Calif.....C. H. Grant Company

NEW HAMPSHIRE
Barre, Vermont.....Casellini-Venable Corporation
Boston, Mass.....The Equipment Company
Portland, Maine.....Stanley & Cadigan Company

NEW JERSEY
New York, N.Y.....R. E. Brooks Company
Philadelphia, Pa.....Giles & Ransome

NEW MEXICO
Albuquerque.....Power Equipment Company

NEW YORK
Albany.....Larkin Equipment Company
Buffalo.....Trevor Corporation
New York.....R. E. Brooks Company

NORTH CAROLINA
Raleigh.....Carolina Tractor & Equipment Company
Salisbury.....Carolina Tractor & Equipment Company

NORTH DAKOTA
Fargo.....Dakota Tractor & Equipment Company

OHIO
Cleveland.....H. B. Fuller Equipment Company
Columbus.....W. W. Williams Company
Cincinnati.....W. W. Williams Company

OKLAHOMA
Oklahoma City.....Leland Equipment Company
Tulsa.....Leland Equipment Company

OREGON
Portland.....Contractors Equipment Corporation

PENNSYLVANIA
Harrisburg.....Dravo-Doyle Company
Philadelphia.....Giles & Ransome
Pittsburgh.....Dravo-Doyle Company

RHODE ISLAND
New Haven, Conn.....The W. I. Clark Company

SOUTH CAROLINA
Columbia.....Jeff Hunt Road Machinery Company

TENNESSEE
Chattanooga.....Nixon-Hasselle Company
Knoxville.....Wilson-Wearner-Wilkinson Company
Nashville.....Wilson-Wearner-Wilkinson Company

TEXAS
Dallas.....Conley-Lott-Nichols Machinery Company
Houston.....R. B. Everett & Company
San Antonio.....Cochran Equipment Company

UTAH
Salt Lake City.....Lund Machinery Company

VERMONT
Barre.....Casellini-Venable Corporation

VIRGINIA
Roanoke, Roanoke Tractor & Equipment Corporation
Richmond, Roanoke Tractor & Equipment Corporation

WASHINGTON
Seattle.....L. A. Snow Company
Spokane.....Empire Equipment Company

WEST VIRGINIA
Charleston, Charleston Tractor & Equip. Corporation
Clarksburg, Charleston Tractor & Equip. Corporation

WISCONSIN
Milwaukee.....Hunter Tractor & Machinery Company

WYOMING
Billings, Mont., Western Construction Equip. Company
Denver, Col.....Ray Corson Machinery Company

**CLEARING
HOUSE
FOR**

CONCRETE SPREADERS • ROAD FORMS
CONCRETE FINISHING MACHINES • BINS AND BATCHERS
BULK CEMENT PLANTS • CENTRAL MIXING PLANTS

Blaw-Knox War Materials

PRESENTS A PLAN CONSTRUCTION INDUSTRY

...the plan...

Blaw-Knox Company, through its offices and its sixty-five distributors, is establishing a national clearing house for used construction machinery of the types listed below which may be utilized for war construction.

Contractors having idle equipment and those in need of such equipment for war construction are invited to communicate with the nearest Blaw-Knox Distributor or with the Company direct, giving details including selling or rental prices.

The Company will then place the seller and buyer in contact with each other through their respective Blaw-Knox Distributors. The Blaw-Knox Company will not enter into the transaction beyond this point as it is interested only in serving to the greatest extent possible in the conservation of vitally needed war materials.

Because our widespread organization is expert in the distribution and servicing of construction machinery, there will be further assurance that equipment at present available will be placed in use where needed on war work. This plan should result in a decided saving of critical materials otherwise used in the manufacture of new equipment.

Naturally, the Blaw-Knox Company will continue to manufacture new equipment to the extent that Government Authorities deem necessary for vital construction.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY
2003 Farmers Bank Building Pittsburgh, Pennsylvania

NEW YORK—Canadian Pacific Building • CHICAGO—Peoples Gas Building
PHILADELPHIA—Broad Street Station Building • BIRMINGHAM—Brown-Marx Building

Representatives throughout the country

**CLEARING
HOUSE
FOR**

TRUCK MIXERS • CLAMSHELL BUCKETS
CONCRETE BUCKETS • STEEL STREET FORMS
TRUCK TURNABLES • TAMPING ROLLERS

HOW TO INCREASE TRACTOR USEFULNESS

HANDLE YOUR HEAVY CLEARING WITH THE SAME LeTOURNEAU ANGLEDOSERS AND BULLDOZERS YOU USE FOR PUSHER LOADING, PIONEERING SIDEHILL CUTS, SPREADING AND OTHER SHORT-HAUL EARTHMOVING JOBS.



Many smart contractors with heavy clearing problems find they save time removing the "big ones" by: (1) saucering out dirt around the fall side of the tree, (2) applying the Dozer blade high up the trunk for extra leverage to rock the tree a few times, then (3) taking it out with a final powerful shove. Fast? You bet! Try this job-proved method on your next tough clearing job. The accompanying diagrams show you how:

Saves Manpower

The tremendous power of LeTourneau Dozers, combined with their trigger-quick cable action and rugged, all-welded steel construction, enable you to handle your toughest clearing—trees, stumps and heavy boulders—at a fraction of the time and cost of hand labor crews and powder.

At Your Service

Despite sturdy LeTourneau construction and design, breakdowns are bound to occur occasionally in extremely heavy work like this. If they do, you'll find your local LeTourneau-"Caterpillar" dealer ready to help you, with genuine LeTourneau-made parts and factory-trained servicemen, to keep your equipment working with a minimum of delay. Call him TODAY . . . and any day you have equipment maintenance or job planning problems.

HELP YOU WIN WAR—LeTOURNEAU AD POLICY

The General Manager says, "All LeTourneau efforts must be concentrated on winning the war." That means LeTourneau advertising, too. Because construction work is so important and because so many of you will have to make your present equipment last for the duration, we believe our advertising can best help by:

1. Suggesting ways of getting more work from your present equipment.
2. Showing and telling how others are using LeTourneau equipment to increase production.
3. Aiding you with service and repair ideas.

These things we will strive to do in every LeTourneau advertisement.



Fast cable operation adds a powerful kick to the LeTourneau Dozer's extremely high lift. Here, contractors Christensen and Waggoner, of Bagley, Minnesota, quickly and easily take out trees 10 to 15 inches in diameter with a LeTourneau Angledozer and "Caterpillar" D6.

FREE BULLETIN TELLS HOW TO MAKE YOUR CONSTRUCTION TIRES LAST LONGER

This fact-packed bulletin, "Stretch Your Tires", is specially prepared by LeTourneau for contractors, servicemen, mechanics, operators and all others who take care of construction tires. Contents include:

Recommended tire pressures for all LeTourneau Carryalls, Cranes, Tournapulls, Tournatrailers and Tournacranes · Tire-conserving operating hints · Proper tire upkeep and repair · Haul road maintenance · Recommended tire tools, accessories, etc.

Ask your LeTourneau dealer for a copy of "Stretch Your Tires", or write to R. G. LeTourneau, Inc., Peoria, Ill. It will help you keep your tires rolling longer.



They're Laying Bomber Runways of Minus 1" Slump Concrete—25 Ft. Slab— **AT 250 LINEAR FT. per HOUR!**



AS SHOWN HERE
JAEGER *Screw* SPREADER
JAEGER *Type "H"* FINISHER
Placed Up to 135 Cu. Yds.
an Hour — AVERAGED Over
120 Cu. Yds. an Hour Day After
Day, on Muroc Bomber Range,
California—Perry & Pearson, Contractors

**Look at These Records of Production: Dry Concrete Re-Mixed,
Spread and Finished as Fast as Dual Drum or Multiple Pavers Can Pour
— No Segregation — Denser, Smoother Slab — Smaller Paving Crews**

Could not have handled the very dry concrete in 25' width without Jaeger Team on Ft. Wayne, Ind. Airport, reports James A. McKay & Sons.

On 86 miles of 20'-24' slab all engineers highly pleased with work of our 4 Jaeger Spreaders—Koss Constr. Co.

On Higley Airport, Jaeger Team placed 362' per hour of 1½" slump concrete 12'6" wide without labor in front of machines—no trace of segregation—Arizona Constr.

Ran crew with 3 to 5 less men—C. H. Atkinson Pvg. Co.

63 miles of 20' slab laid in 42 days by 4 Jaeger Finishers on Ford Willow Run Bomber Plant.

On Pennsylvania Turnpike (12' slab, 8" thick, 1"-1½" slump concrete) Adam-Eidemiller did 5160' in 14 hours. Tri-State Engr. averaged 4000 sq. yds. daily on 167,000 sq. yds. contract, both using Jaeger Teams.

Bump grinder used only 1 day on 5 miles of 25' pavement at Ravenna, Ohio Arsenal—Hollinger-Davidson Co.

Highway Dept. tests, in various States, prove Jaeger Re-Mixing Screw increases strength and density of concrete.

Spreader can be equipped to spread and finish bituminous surfaces—Barber Constr. Co. laid up to 150 tons per hour of 2-course resurfacing, Illinois I-11 Specifications.



GET THE PROOF—Contractors Signed Reports on Dozens of Jobs, Plus Data, Specifications YOU NEED TO FIGURE TODAY'S PAVING WORK THE JAEGER MACHINE CO.

World's Largest Mfr. of Spreading, Finishing Equip. 223 BURLIN AVE. COLUMBUS, O.

ROCK ON THAT JOB?



★ You will drill it faster — with less air, and with less repair costs, if you use Clevelands. Whatever the type—hand sinkers—wagon drills—paving breakers—clay and trench diggers—backfill tampers. All the accessories, too—drill steel and rods—detachable bits—paving breaker chisels—air hose—valves and couplings. Machines placed on trial. Surprisingly prompt deliveries.

BRANCH OFFICES

Birmingham, Ala.	Dallas, Texas	Philadelphia, Pa.
Berkeley, Calif.	Detroit, Mich.	Pittsburgh, Pa.
Boston, Mass.	El Paso, Texas	Richmond, Va.
Buffalo, N. Y.	Ironwood, Mich.	Salt Lake City, Utah
Butte, Mont.	Los Angeles, Calif.	St. Louis, Mo.
Chicago, Ill.	Milwaukee, Wis.	Victor, Colo.
Cincinnati, Ohio	New York, N. Y.	Wallace, Idaho
		Winchester, Ky.

CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby St., Vancouver, B. C.
Whitehall Machine & Tools, Ltd., Galt, Ontario

COMPRESSED AIR IN INDUSTRY CONTEST
now streamlined for WAR—prizes doubled—now \$1000.00
closing date extended to July 1, 1942

THERE IS STILL TIME TO ENTER—rules free
Write Educational Director

COMPRESSED AIR INSTITUTE, East Orange, N. J.



THE
CLEVELAND ROCK DRILL
COMPANY
CLEVELAND, OHIO

LEADERS IN DRILLING EQUIPMENT

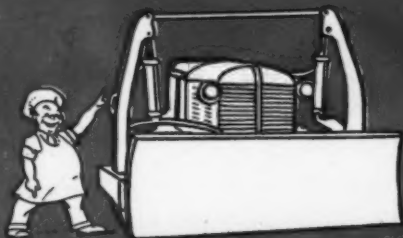
You can depend on Baker Hydraulic Bulldozers

in the tight spots!



EASIER TO OPERATE!

No levers to shove or tug—no twisting around—one small handle gives you fast, smooth action. 4 positions in logical order—"Float," "Down," "Hold" and "Raise"—it's simple, it's easy, it's faster!



GREATER STABILITY—SAFER!

Baker's are not dependent on the tractor to hold them together. Overhead brace prevents torsional strain and protects operator against falling trees and in case of upsets. Cylinders are up away from the mud, dust and dirt. Better visibility!

Baker's faster, more positive, direct lift and down-pressure is a natural for tight spots like this job—leveling around piers on a new War Department Building—Potts & Callahan, Contractors. That hair trigger action is just what is needed for most other grading, leveling, backfilling and earth moving jobs, too—in close quarters or out in the wide open spaces.

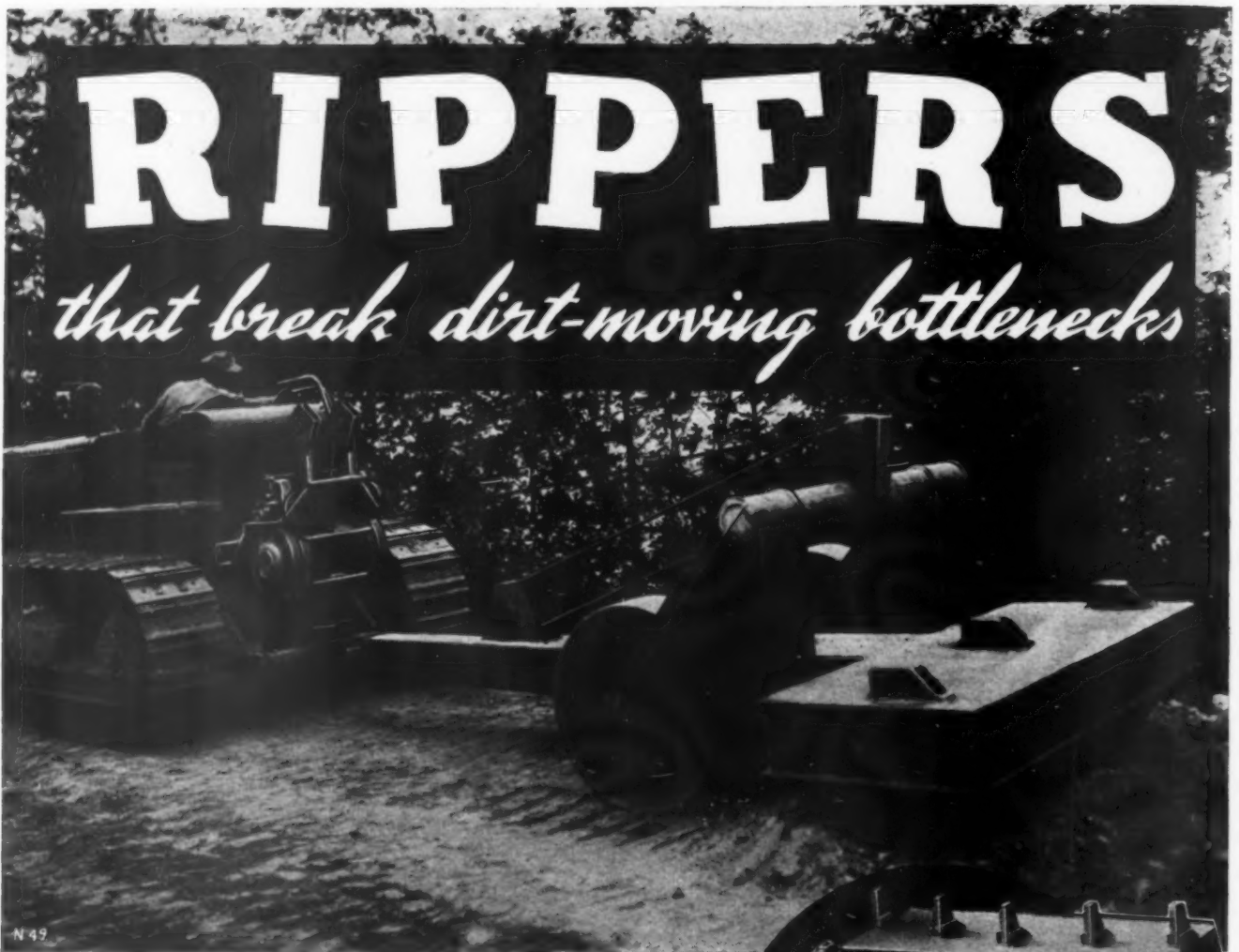
Baker's are helping Uncle Sam out of a "tight spot" by doing the bulldozing and grade-building with a minimum of fuss and maintenance on scores of war program jobs. War or peace, you can make the most of available horsepower with a Baker on your tractor front end.

The Baker Mfg. Co.

506 Stanford Ave., Springfield, Ill.

BAKER

The Modern Tractor Equipment Line
for
**EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE**



Save time on those rush war dirt-moving jobs by using Bucyrus-Erie Rippers to break up the tough-digging, hard-loading materials. Breaking up the material — shale, hardpan, decomposed granite, sandstone, old macadam, etc. — will enable scrapers to load easier, faster, and get fuller loads. In some cases, expensive drilling or blasting can be eliminated.

CABLE RIPPERS — Quick, accurate control of digging depth is provided by a cable, operated from the tractor winch. Can be used with one, two, or three teeth. Standards can penetrate full length below ground — 17 inches on Model CR-1 and 24 inches on Model CR-2. Self-sharpening points of heat-treated alloy steel are easily replaced. Powerful breaking action; fast powerful lift.

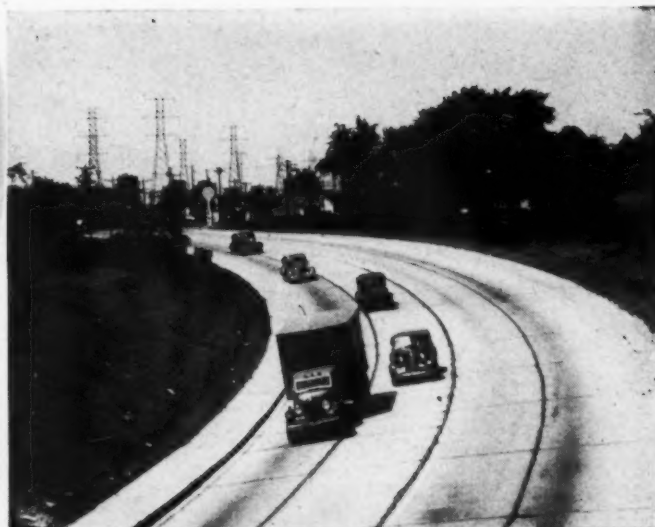
ROTARY RIPPERS — Particularly handy for "odd-job" ripping because no power hook-up is needed. All you have to do is connect to the drawbar and go to work.



The self-cleaning rotation of the head swings the teeth in a complete revolution that help roll out rocks and other obstacles. Any combination of teeth, one to five to fit your work. Replaceable slip-on points protect teeth. — BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin.

**BUCYRUS
ERIE**
TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTOR
DISTRIBUTOR



**We've Got to Keep
'em Rolling . . .
to Victory**

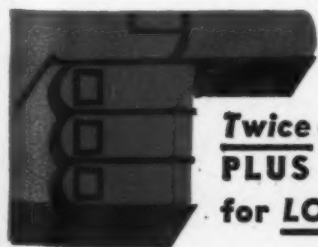
Here they come—trucks by the thousands, roaring night and day over the nation's highways, carrying food, war materials, all kinds of supplies for our land, sea and air forces. Scout cars, jeeps, motorcycles, motorized columns on the march—all rely upon our highways to "keep 'em rolling."

Time out for repair and maintenance of drainage structures now is not only costly but presents a real threat to our eventual success.

Corrugated drainage pipe can be installed to replace old and failing structures while traffic continues. This can be done quickly and eco-

nomically. The pipe itself can be jacked underneath . . . that is, forced through the embankment or subgrade, either for drainage or as a conduit for public service lines. Corrugated metal pipe can also be threaded through the old or failing structures, thus replacing a dangerous hazard with a modern, strong and durable structure.

Threading or jacking saves time, avoids traffic delays, is economical and provides permanent structures. Your nearest Toncan Iron Man can tell you more. The Toncan Culvert Manufacturers Association, Republic Bldg., Cleveland, Ohio.



**Twice as much copper
PLUS molybdenum
for LONGER service**

TONCAN IRON
PRODUCT OF REPUBLIC STEEL

ROADS AND STREETS, May, 1942

FOR OFF-THE-ROAD HAULING

-You need **MORE** than
"Heavy Duty" Trucks



... You need

**WALTER
TRACTOR TRUCKS**
with
4-POINT POSITIVE DRIVE

A truck that is rated "heavy duty" for highway hauling, too often fails in off-the-road work. Here, loads are heavier, pulls are tougher, riding surfaces are poorer. Under such conditions, "rated horsepower" means little. What counts most are *delivered power—traction—maneuverability—ruggedness—special engineering . . .* and you get them **ALL** in **WALTER TRACTOR TRUCKS!**

Most important, you get **WALTER 4-Point Positive Drive**, which gives you **FOUR** powerful driving wheels, with 100% traction in each. Patented Lock Differentials proportion the torque to each wheel

according to its traction, putting the most power where it is most needed. That's why **WALTER TRACTOR TRUCKS** can be depended on to keep loads moving in any weather, under any running conditions. And it explains their great reputation as Snow Fighters. Before buying another truck for heavy off-the-road hauling or winter snow removal, write for literature giving full details about **WALTER 4-Point Positive Drive Trucks.**

WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.



HERE'S THE ENTIRE INJECTION SYSTEM OF THE HD-7 ENGINE

... the unit injectors that measure, inject and atomize the fuel, directly into the cylinders. That's why combustion is more complete, smoother ... why starting is easier ... why servicing and maintenance costs are cut ... why 2-Cycle Diesels have earned the "rep" as the most simple, dependable engines on the job.

The unit injection system eliminates costly delays ... factory servicing ... delicate adjustments! No grief with leaky, clogged, or air-locked high pressure fuel lines ... because there are no high pressure lines. No trouble with costly, troublesome fuel pumps ... because there are no fuel pumps.

Simplicity of design is carried throughout the entire engine so that Diesel experts are unnecessary ... so that repairs or adjustments are seldom required ... so that your job keeps running in high gear at all times. Any way you look at it you're ahead with 2-Cycle Diesel power—it offers you more value, more performance, more work for your dollar! Get the inside story of these remarkable engines in our booklet "Modern Tractor Power."

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE • U. S. A.

2-Cycle
THE MODERN
DIESEL POWER

HELP BRING VICTORY

1. Extend the life of your present equipment ... make needed repairs, replace worn parts. Your Allis-Chalmers dealer is prepared to give you A-1 service!
2. Sell your scrap! Your country is in urgent need of scrap!
3. Keep in touch with your Allis-Chalmers dealer ... even if you have no priority rating. You may find good buys on used equipment.

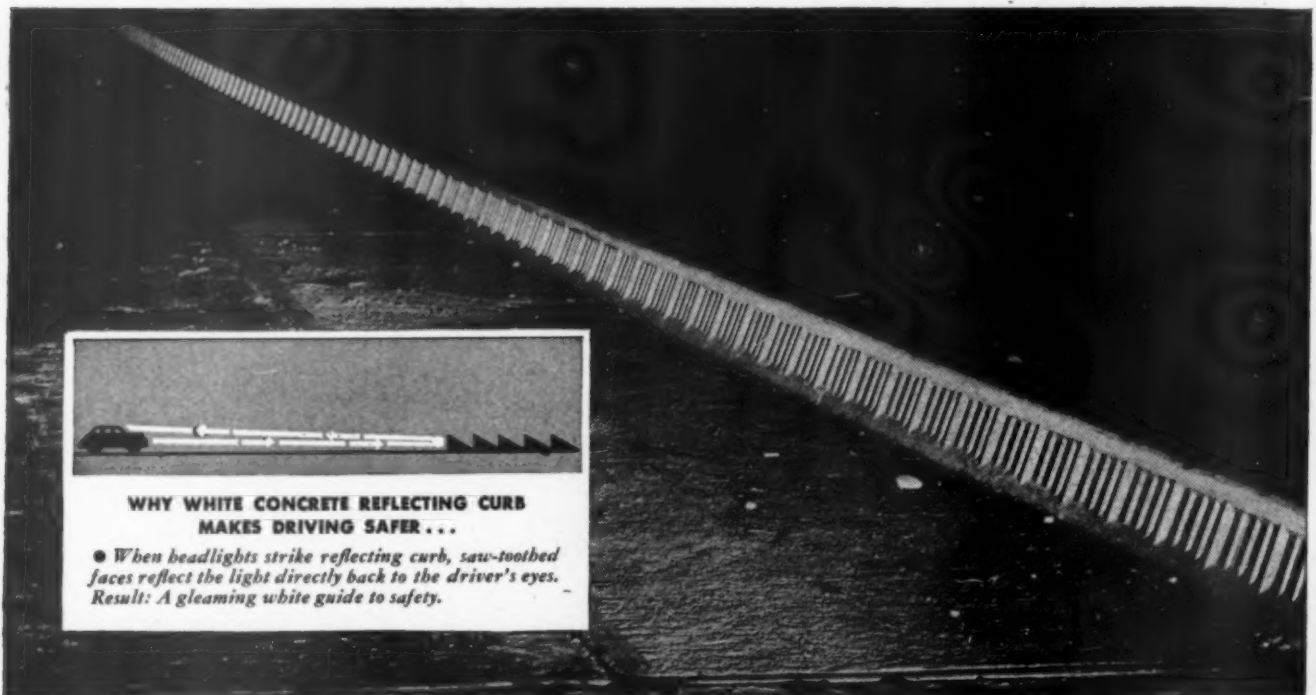
3 SIZES: HD-7, HD-10, HD-14
60 TO 132 DRAWBAR H.P.

ROADS AND STREETS, May, 1942



HOW TO HELP KEEP UNCLE SAM'S TRAFFIC ROLLING SAFELY

White Concrete Reflecting Curb on military access roads and strategic highways helps reduce accidents and speeds traffic flow by increasing driving visibility



WHY WHITE CONCRETE REFLECTING CURB MAKES DRIVING SAFER...

● When headlights strike reflecting curb, saw-toothed faces reflect the light directly back to the driver's eyes. Result: A gleaming white guide to safety.

EVERY TRUCK... every "jeep"... every piece of mechanized military equipment and every private car is worth more today than ever. Victory partly depends upon keeping them rolling safely. And that is where White Concrete Reflecting Curb enters the picture.

Many accidents on our highways have been due to poor visibility—particularly at night. On any important highway, especially on new access roads and along strategic highways, White Concrete Reflecting Curb adequately defines the road by day and provides a prominent white guide to safety at night, even on dark rainy nights when normally there is almost a complete blackout.

The reason is as simple as ABC. Reflecting curb, made with Atlas White cement, has saw-toothed faces. These

faces are designed and angled to reflect the light from the driver's headlights directly back to his eyes. Thus the curb is highly visible and provides a gleaming guide to safety far ahead of the car.

Only reflecting curb can do this. Smooth curb wastes the light. It reflects it forward, away from the driver, and visibility is poor. Reflecting curb conserves the light. It directs it back to the driver, and visibility is high.

The new 32-page book, complete with photographs, illustrations, working drawings and specifications, tells the story of this new safety curb. Send today for "A White Guide to Safety." Write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Bldg., N. Y. C.

Facts to remember about White Concrete Reflecting Curb

1. Adequately defines the road by day.
2. Provides a bright guide to safety on dry nights, and an even brighter guide on rainy nights with no other illumination than car headlights.
3. Is moderate in first cost and low in maintenance cost.
4. Is built of white concrete because (1) white surfaces reflect, do not absorb light and (2) white concrete provides sharp contrast to surrounding objects.

OFFICES: New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.

RS-M-29

WHITE CONCRETE REFLECTING CURB

MADE WITH ATLAS WHITE CEMENT



Adnun Pavers

for SPREADING ROCK

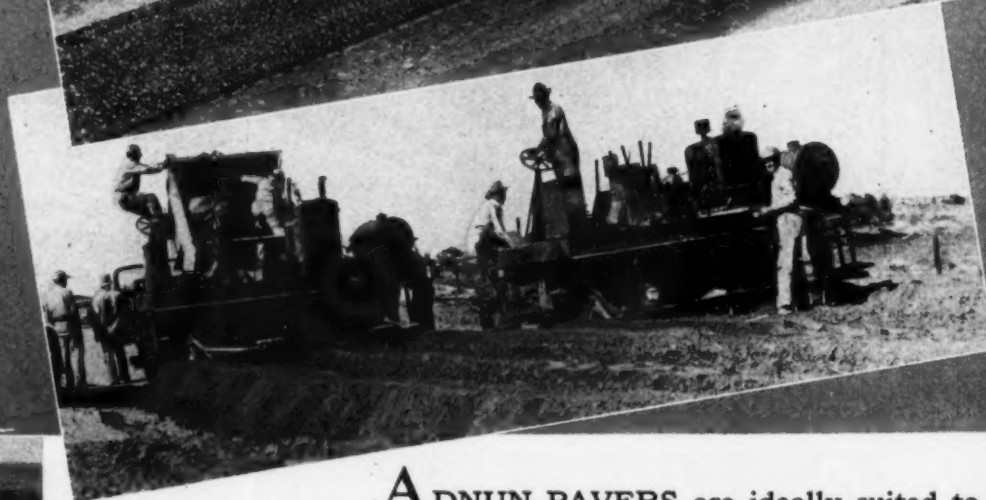
Laying a base course of heavy rock for a water-bound macadam road with a standard Adnun Paver. Capacity up to 100 tons per hour and more.

for BLACK TOP PAVING

Any black top surface, hot or cold, can be laid at a rate of 1,000 tons or more per day with an Adnun Paver. Pavement illustrated is typical.

for SPREADING SOIL CEMENT

Two Adnun Pavers putting down a 15 inch course of soil cement which requires spreading full width of road at one time.



ADNUN PAVERS are ideally suited to practically all types of road surfacing except cement concrete. They provide high output, economical use of materials and a surface smoothness practically impossible to obtain with other methods. Only Adnun Pavers have Continuous Course Correction that levels out surface irregularities with each succeeding course. And these Adnun advantages mean lower costs, faster work:

Sturdy construction that endures hard service . . . The power cut off — no tag end runouts . . . Power to handle the heaviest truck . . . Hydraulic controls — Overlapping action Cutter Bar — makes a perfect joint under pressure . . . Full adjustment for bank and wedge courses . . . Capacity to over 1,000 tons a day. Write for catalog.

THE FOOTE COMPANY, INC., Nunda, N. Y.



Laying Black Top
runways on huge
airport expansion.

ADNUN

**BLACK TOP
PAVERS**

MULTIFOOTE

**CONCRETE
PAVERS**

Our "ARMY" Travels on its Stomach—
 EXPERIENCE BUILDS 'EM
 PERFORMANCE SELLS 'EM

ROGERS HEAVY DUTY TRAILERS **LEND a HAND**
 on the
HEAVY EQUIPMENT

ROGERS BROTHERS CORP.
 110 Orchard St.,
 Albion, Pa.



BROOKS LOAD LUGGER

is your "best bet" for highway jobs and municipal work

SAVES man-power
 CONSERVES trucks
 CUTS costs

Low Headroom
 No Counterweights
 15 Seconds, Lift or Dump
 Fits any Truck Chassis
 One-piece Bucket

For further details, ask for Catalog No. 44



Distributors in all Principal Cities

One LOAD LUGGER with 5 to 10 detachable dump buckets is equal to a whole fleet of ordinary trucks. Permits continuous hauling—no lost time standing by for load-ups.

505 DAVENPORT ROAD

Brooks EQUIPMENT & MFG. CO.
 KNOXVILLE, TENNESSEE



Check

IN AT A DeWITT OPERATED HOTEL

In Cleveland
THE HOLLENDEN

In Columbus

THE NEIL HOUSE

In Lancaster, O.

THE LANCASTER

In Akron

THE MAYFLOWER

In Corning, N. Y.

THE BARON STEUBEN

The Hotels that Check with Every Travel Standard

THEO. DeWITT

PRESIDENT



Soil Stabilization

By **V. J. Brown**
 Publishing Director
 ROADS AND STREETS

C. A. Hogentogler
 Senior Highway Engineer,
 U. S. Public Roads Administration

C. A. Hogentogler, Jr.
 Research Engineer,
 George Washington University

Frank H. Newman, Jr.
 Binder Research Engineer,
 Texas State Highway Department

C. M. Lancaster
 Soils Engineer,
 Missouri State Highway Department

E. S. Barber
 Junior Highway Engineer,
 U. S. Public Roads Administration



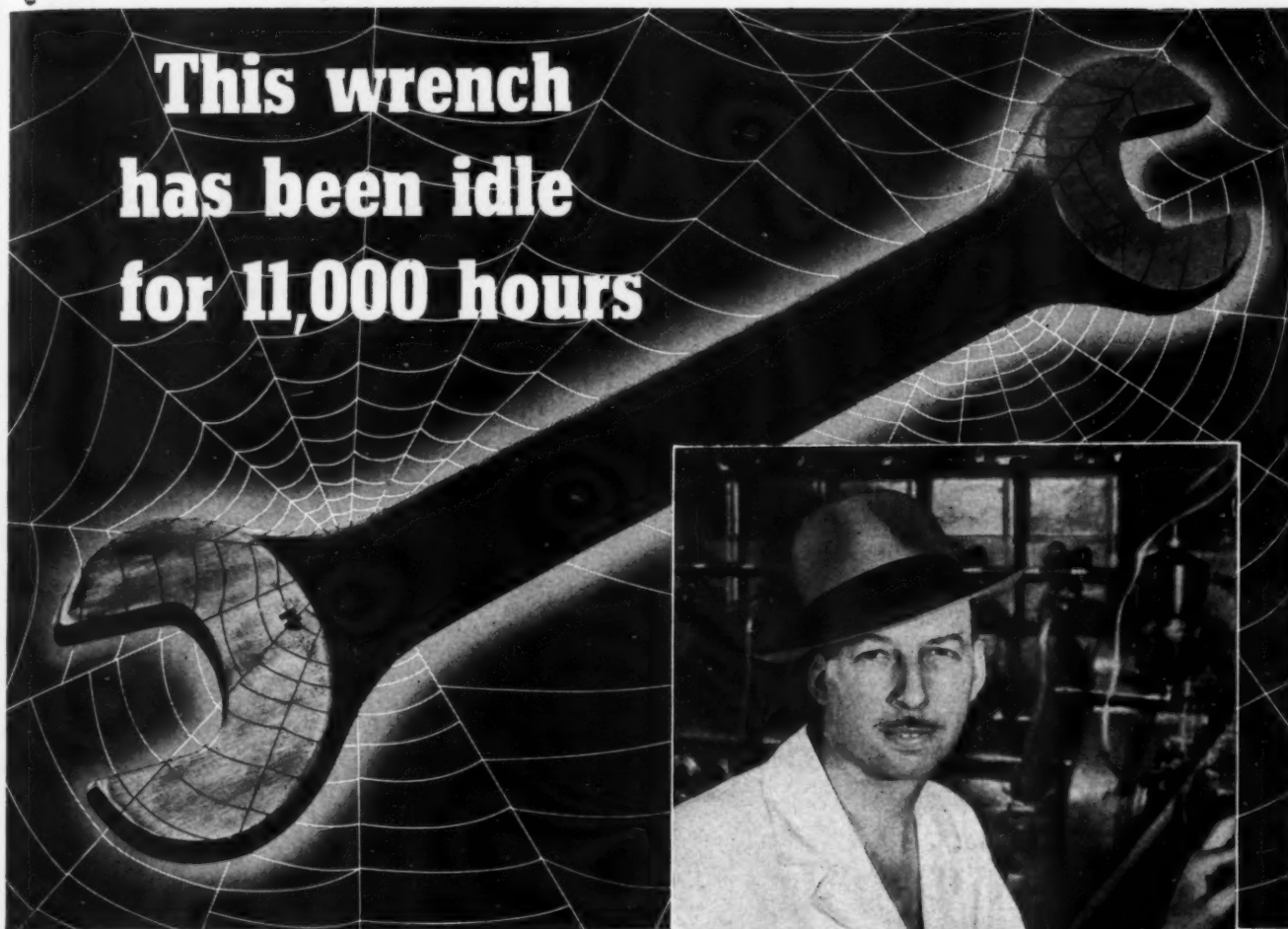
This book is reprinted from a series of articles published in ROADS AND STREETS. Demand for the series was world wide. The book treats of fundamentals of soils mechanics and soil stabilization such that the average engineer can get a complete understanding of this new branch of highway engineering.

Profuse illustrations tell more than words could.

141 pages—Hard binding
GILLETTE PUBLISHING CO., 330 S. WELLS ST. CHICAGO ILL.
 Price, \$2.00 Plus Postage

ROADS AND STREETS, May, 1942

**This wrench
has been idle
for 11,000 hours**



Gus Zimmerman's wrench has not always led such an easy life. As chief engineer for the Galland Laundry in San Francisco, Mr. Zimmerman's job is to take care of all the intricate machinery in a plant that uses 118,252,000 gallons of water and 1,665,000 gallons of soap per year. A very important part of that machinery is a big Diesel-generator set that handles the juice for the night shift.

For some reason that nobody could figure out, that engine kept Mr. Zimmerman's wrench busy. For the first two years of its life it only averaged 2700 hours between overhauls. Rings stuck, cylinder wear was high, gum and carbon stuck the

valves, and the din it made carried across the street.

At this point it is probably better to let Mr. Z. do the talking:

"Yes, we tried out RPM DELO, and frankly I wasn't sure it would make a great deal of difference. But it did. We haven't had a stuck ring or stuck valve—and the engine is so quiet now you can carry on a normal conversation right beside it. But what counts most is it has run 11,000 hours without my putting a wrench to it and it is still going strong."



ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under the following names:

RPM DELO

Caltex Diesel Engine Lubricating Oil • Sohio RPM DELO • Caltex RPM DELO
Kyso RPM DELO • Signal RPM DELO • Imperial-RPM DELO (concentrate)

Ask your Diesel engine manufacturer or distributor for the
RPM DELO supplier in your vicinity.

STANDARD OIL COMPANY OF CALIFORNIA

ROADS AND STREETS, May, 1942

Instantaneous Dumping

IMPORTANT—Simplicity . . . no mechanical body hoisting machinery . . . dumping by gravity, instantaneously . . . saves seconds with every load . . . body is dumped by releasing body latch with lever.

Making The Dirt Fly... Uphill

This action "shot" speaks! It tells the story, better than words, that the Koehring Dumptor dumps the load *instantaneously*, and uphill! Seconds are saved with every load! Every load is dumped *instantaneously* and completely, exactly where wanted. Being without mechanical operating parts for hoisting and dumping, the Koehring Dumptor does not consume time *preparing to dump*. The balanced body returns to loading position by force of momentum. *Instantaneous gravity dumping* cuts round trip time, increases production. Check your hauling operations and see how much time you are losing on the fill!

KOEHRING COMPANY • Milwaukee, Wisconsin



HEAVY-DUTY CONSTRUCTION EQUIPMENT

"Gulf Lubricants and Fuels make a big difference on a tough job"

*Says highway contractor**



* Fred Berlanti and Son, Inc., Harrison, New York, have a 6½-mile road construction job in Lebanon and Berks Counties, Pennsylvania. Gulf quality lubricants and fuels are helping this contractor secure efficient, trouble-free performance. The modern equipment employed includes compressors, drills, scrapers, shovels, ditchers, bulldozers, and trucks.

"Mud or dust, hot or cold, we get top-notch performance from our equipment and extra hours of trouble-free operation with Gulf products."

ALL-WEATHER protection with Gulf lubricants and the uniform high quality of Gulf fuels are playing a big part in our rapid progress on this job," says Louis Berlanti, President. "In spite of day-to-day changes in operating conditions, our equipment is performing at top-notch efficiency, and we have avoided delays caused by mechanical troubles."

You get these three advantages when you use Gulf products: First, an experienced Gulf engineer recommends—on the job—the proper types and grades for each requirement. Second, you're *sure*



of getting lubricants exactly suited to your equipment and to your operating conditions—for the Gulf line includes over 400 quality oils and greases. Third, Gulf's wide distribution through more than 1200 warehouses, located throughout 30 states from Maine to New Mexico, insures prompt delivery, no matter how remote the job.

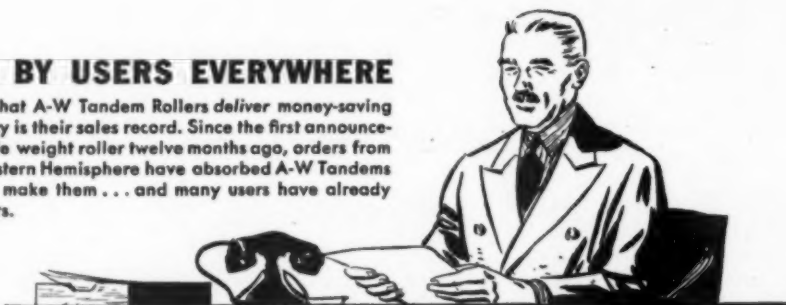
Write or 'phone Gulf now and arrange to use Gulf higher quality lubricants and fuels on your next job. They will help you complete it more quickly and at a bigger profit.

GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.

ROADS AND STREETS, May, 1942

APPROVED BY USERS EVERYWHERE

The best evidence that A-W Tandem Rollers deliver money-saving speed and efficiency is their sales record. Since the first announcement of this variable weight roller twelve months ago, orders from all parts of the Western Hemisphere have absorbed A-W Tandems as fast as we could make them . . . and many users have already placed repeat orders.

**SHOWS UP BEST at the SHOWDOWN**

● Here's a roller you can count on for fast, economical performance season after season. Its many refinements in design make this smooth performing A-W Tandem a preferred machine for accurate roller work.

With an A-W Tandem your operator can work closer to curbs because visibility is better, there is less frame overhang, and more ground clearance under side plates. More convenient controls, with reversing clutch lever mounted on steering column, combine with effortless hy-

draulic steer to save time and increase efficiency. It changes direction—forward or backward—with that vibrationless smoothness that means a better job and less wear and tear on the machine itself. A lower center of gravity prevents side sway.

A-W variable weight Tandem Rollers are built in 5 to 8 ton and 8 to 10½ ton sizes. Write for complete information on advantages they'll give you on the wide variety of jobs a tandem is called upon to handle.

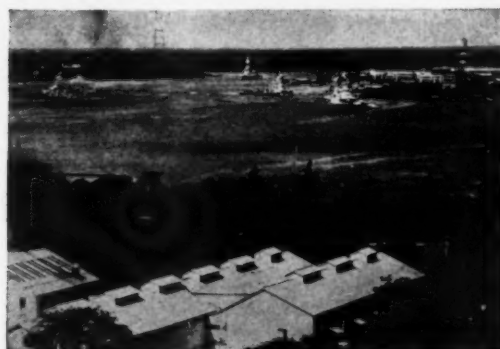
THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

MOTOR GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS
LOADERS • ROLLERS • ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES



The Nation's Contractors Are Remembering Pearl Harbor

Armed with a grim determination, the contractors of the Nation have mustered their man and machine power in an all-out war effort. A powerful influence on the final results are the hundreds of MARIONS actively engaged in digging and loading vital road building materials, raw materials for cement, rock for harbor improvement and damsites, and moving millions of yards of excavation on important defense projects. Maximum yardage is Marion's way of saying, "VICTORY will be ours."



THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A. *Offices in all principal cities*
Serving industry since 1884

MARION

SHOVELS • DRAGLINES • CLAMSHells
CRANES • PULL-SHOVELS • WALKERS
Gasoline — Diesel — Electric — $\frac{3}{4}$ cubic yard to 35 cubic yards

TANK CARS ARE VITAL TO VICTORY...

"KEEP THEM ROLLING"



...AND SPEED YOUR OWN ASPHALT DELIVERIES, TOO!

● Today, unprecedented quantities of bituminous materials are urgently needed for defense highways, airports and access roads. Tank cars for asphalt deliveries are vitally important. How can these increased demands be met with the limited supply of cars available?

You can help answer that—and speed your own asphalt deliveries, as well. Keep your tank cars rolling. There are four simple ways suggested here. The Standard Oil Asphalt representative in your locality will work with you in developing plans to meet this emergency. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the representative nearest your job.

OIL IS AMMUNITION  USE IT WISELY

Copyright 1942, Standard Oil Company (Ind.)

4 ways you can help keep tank cars rolling

1. **Accurately estimate your asphalt needs** when placing yearly contracts. An extremely high estimate may force your supplier to hold large stocks and delivery facilities open which others might need.
2. **Carefully plan delivery schedules**, as far in advance as possible, so that your supplier and your railroad can be sure that transportation is available when you want it.
3. **Speed up unloading** by scheduling deliveries when your crews and equipment are available.
4. **Release empty cars.**

**ASPHALT FOR
EVERY PURPOSE**

STANDARD OIL COMPANY
(INDIANA)

ROADS AND STREETS

May, 1942, Vol. 85, No. 5

Importance of Maintenance to Low-Cost Roads

By BEN H. PETTY

Professor of Highway Engineering
Purdue University

WHAT the immediate future holds in store for road improvement, no one can foresee. The effects of the war emergency necessarily will bring about many radical changes in the use of materials, equipment, and road improvement procedures in general. Priorities will force us to new methods wherein materials and their various combinations will be utilized which heretofore have been considered by some as undesirable.

The Low-Cost Field

The field of low-cost road improvement in this country is so vast as to be almost beyond comprehension. A 1940 Bureau of Census report indicates that only 47.2 per cent of the farms in the United States are located on "gravel roads or better." This means that in spite of all the billions of dollars we have poured into highway improvement, today we still have half or more of our farms served by mud roads. Road improvement affects the very lives of every man, woman and child in a community.

Since the motorist is paying almost the entire highway bill, it is up to the road men to satisfy him and give him what he calls a good road by seeing that the road surface is properly built and is maintained constantly in a smooth, safe riding condition. It is the writer's opinion that neglected maintenance of road surfaces and shoulders brings more condemnation down on the heads of road men than unsatisfactory location, poor design and faulty construction. In many cases good maintenance can compensate to a certain extent for some of these other failures.

Earth Roads

Now let us take up some of these low-cost types in succession. Earth roads in general exist only where traffic is light. Usually funds for maintaining these roads are quite limited, yet to keep them in reasonable con-



Contractor C. E. Edgington, Findlay Ohio, brooming a chip seal black-top surface treatment. Note stone shoulder placed to protect ravelling of edges

dition for traffic, certain operations are necessary. In some climates almost complete reshaping is necessary in the late spring after the frost has left the ground and the soil is in suitable condition for reworking. The correct surface crown, shoulder slopes, and side ditches should be reestablished and the road should be dragged under traffic until consolidated to the proper grade and crown. During the summer months dragging operations should be carried on as needed, after rains, to keep the road surface in proper shape for safe and comfortable travel.

There is little we can do about the dust nuisance during the dry periods unless we are willing to spend additional funds on surface applications of calcium chloride or oil as a dust layer. In many cases the small amount of traffic will not justify this extra expenditure. As traffic and maintenance costs increase in states where gravel or stone are not available at reasonable cost, these earth roads are being stepped up through surface applications of road oil or to a greater degree by scarifying and subsoiling to a depth of four to six inches, thus in many cases insuring year-round usage. Stabilizing earth roads to a



Grading the shoulders of a Chicot County road near Lake Village, Arkansas

depth of six inches would call for approximately three gallons of oil per square yard of surface with a resulting cost per mile of probably \$3,000 for materials and manipulation. After proper curing and consolidation these roads should be sealed with a coating of heavy bituminous material and fine stone chips. Surface oiling is accomplished in some states for \$500 or less a mile a year.

On surface-oiled earth roads, prompt patching of surface breaks is essential, and reapplications of oil is necessary in subsequent years to renew and recondition the surface. In some climates, however, these surface-oiled roads break up completely in the winter or spring and again we have to start practically from scratch in reshaping and reolling the road as was done originally. Where sub-oiling has been practiced, these roads in many climates will go through the winter without breaking up, and while some patching may be necessary, the principal maintenance operation involves light scarifying, reshaping, light application of oil and reconsolidation every few years depending on how rapidly the surface becomes rutted and bumpy under traffic.

Surface applications of calcium chloride to sand-clay roads greatly improve their serviceability. Similar results can be obtained from light applications of the proper type of bituminous material.

Gravel and Stone Roads

The big problem in many of our states is the maintenance of unstabilized gravel and stone roads. Repeated dragging with long base maintenance equipment, sufficiently frequent to keep ahead of the destructive



Finishing retreatment with double retreat machine in Orangeburg County, South Carolina

effects of traffic, is absolutely necessary in maintaining this type of road satisfactorily for traffic. Whenever you see an unstabilized gravel or stone road that is full of pot-holes or covered with corrugations, you know at once that the maintenance man has laid down on his job of dragging the road and has let the traffic get ahead of him. We cannot neglect this prompt drag maintenance even in dry weather, although one will admit that it is more effective after rains. Traffic makes roads rough, and traffic continues wet or dry. If we expect to keep gravel and stone roads smooth, drag maintenance must also continue wet or dry. In dry weather, care should be observed not to loosen too much aggregate on the surface, since we must wait for a rain to consolidate this loose material.

The last thing a maintenance man should stop doing to unstabilized gravel or stone roads is the dragging of the road surface.

Maximum Size of Aggregate

The first thing on the "must" list in securing a satisfactory gravel or stone road surface is that *all* of the material going into the road should pass a three-quarter-inch sieve. Preferably, this material should be well graded from coarse to fine and should contain up to 10 or 12 per cent of clay or stone dust as a binder. One mistake which smells to high heaven is the building of unstabilized gravel or stone roads out of materials ranging up to maximum sizes of 1½ or 2 inches. In building gravel roads the material retained on the three-quarter-inch sieve should be put through a crusher and reduced until it will pass through this sieve. Gravel supplies are getting scarce in many communities, and it is a crime to waste this oversize material. Crusher run stone passing the three-quarter sieve will make a road similar to and usually better than a gravel road because of cementing action of the stone dust when wetted by rain and the better mechanical interlocking due to the angular shaped particles.

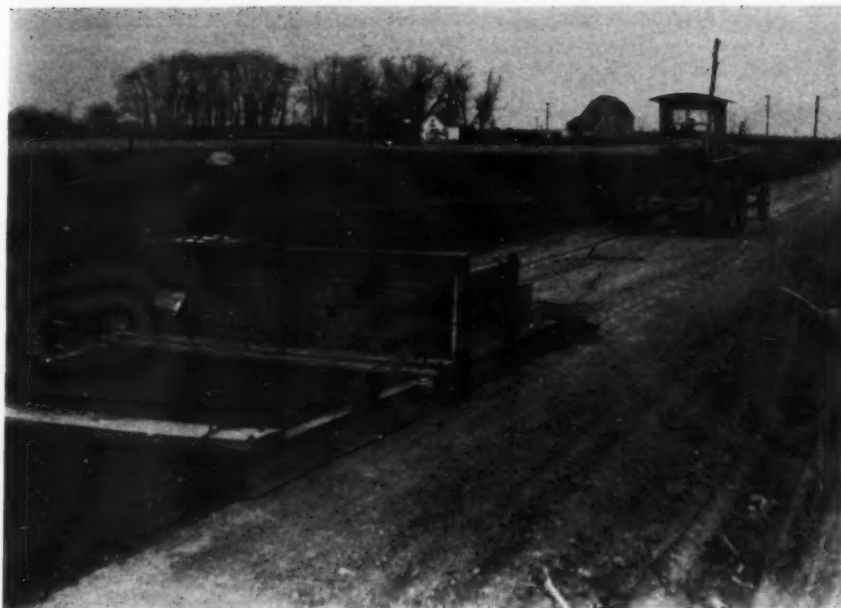
When the traffic increases to the point that it is necessary for us to drag these unstabilized roads two or three times a week, then on the basis of economy, we are justified in resorting to some form of stabilization.

Stabilization with Chemicals

Adequate drainage, where possible, provides one of the best methods of stabilization, and this should be looked after first. Then, to greatly reduce drag maintenance, we can consider stabilization through the addition of the proper amount of clay and chemicals either for surface consolidation or to a depth of several inches. For best results, no form of stabilization should be undertaken



Maintainer unit mounted on Marmon-Herrington All-Wheel-Drive converted Ford rebuilding shoulders by cleaning ditches. Adequate drainage is imperative



Motorgrader pulls homemade gravel spreading box for stabilizing Illinois earth road

until we have made sure that we have adequate drainage facilities and a sufficient thickness of gravel or stone to carry the traffic loads.

Attempts to build up thin stabilized surfaces of one to one and one-half inches with clay and calcium chloride have not been too successful, although it is believed that over a period of time continued applications of calcium chloride as a maintenance operation will tend to increase the stabilizing effect. Studies made at the Purdue Joint Highway Research Project have indicated that surface and admixture applications of calcium and sodium chlorides are carried downward by the action of rain water, and we have found appreciable percentages as deep as eight or 10 inches into the subgrade. One interesting sideline on this study indicates that this migration of the salts into the subgrades may tend to prevent or greatly reduce the destructive effects of frost action. Freezing and thawing tests on some of our soils indicate that an admixture of as little as two or three per cent of these salts practically eliminate frost heave.

Undoubtedly, much better results would be attained through the stabilization of three to six inches of gravel and stone roads with the addition of clay and these chemicals. The available aggregate must be sampled and screened in order to determine the proper amounts of clay and calcium chloride to be incorporated in the road. Some searching may be necessary to uncover suitable clay borrow pits for this operation. Uniformity of distribution of the pulverized clay through the aggregate and the addition of the proper amounts of chlo-

rides are also essential. An adequate crown to insure the rapid runoff of rain water is necessary. It is also important that the road be stabilized to a full two-lane width to prevent raveling at the edges which results on narrow roads where vehicles are forced to run off and on the edges in passing. The costs vary considerably for this type of stabilization, but good results are being secured at costs around \$500 a mile.

Some state and county highway departments are specifying plant mix for this type of stabilization which, of course, increases the cost but insures more careful control. The wet batch is hauled to the road and distributed by means of a spreader box to a depth of about six inches, then when the moisture content has been reduced to the proper point, it is consolidated

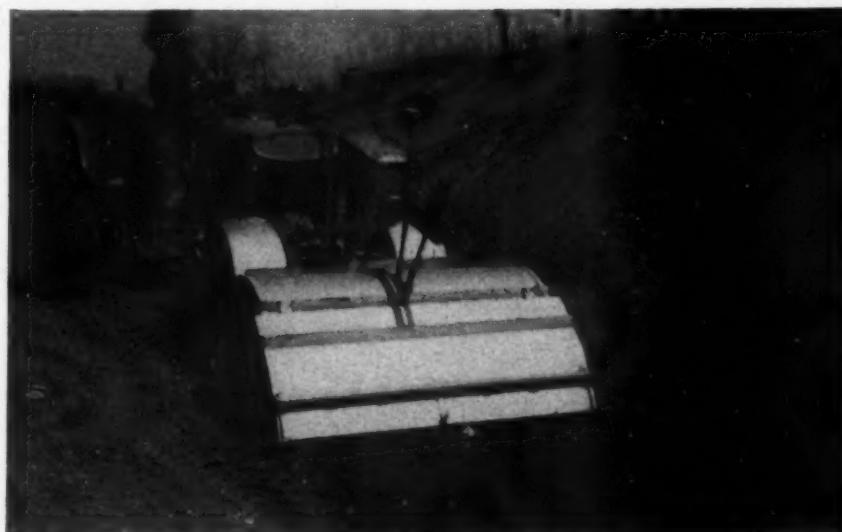
with various types of rolling equipment. These bases are usually given a bituminous surface treatment to better serve the traffic.

Due to the rigid specifications in some states, the cost of a six-inch plant mix stabilized base of this type has run as high as \$12,000 a mile. This should be done for half that figure.

Chloride and clay stabilization certainly have a definite place in our low-cost road program. By stabilizing the road metal we greatly reduce the loss of materials through abrasive action of traffic and the action of wind and rain. The cost of drag maintenance is greatly reduced, since these surfaces can be shaped with blade equipment only after rains. Light applications of chlorides are necessary from time to time as a maintenance operation.

Stabilization with Bituminous Materials

Unstabilized gravel and stone roads are usually first stabilized by the addition of an oil mat from two to three inches thick using about an SC-3 road oil. After a year or so under traffic with the necessary patching operations properly taken care of, this surface is then sealed with a surface treatment using heavy asphalts or tars and small stone chips or pea gravel. This provides a more durable wearing surface but should not be put on until the slowly volatile materials in the road oil have been mostly eliminated and the oil mat has dried out and consolidated properly. Otherwise we are apt to have serious shoving and the development of corrugations on the surface. Maintenance operations consist of prompt patching of small breaks in the surface and re-



Stabilizing road shoulder with rotary soil tiller

sealing with surface treatments every two to five years as warranted by surface conditions.

Most of our low cost bituminous surfaces are constructed by the mixed-in-place method using various grades of bituminous materials such as road oils, cut-backs, emulsions, powdered asphalt, and tars. In general, with the finer graded aggregates, lighter bituminous materials are used and with the coarser graded aggregates heavier materials can be used. In surface treatments and seal coats, the writer thinks we should always use the heavier grade of bituminous materials for durability. The medium curing cut-backs are being favored in some states and counties in the belief that these softer asphaltic cements will not become hard and brittle so rapidly as those of the lower penetration grades.

Much money has been wasted in attempted bituminous surface stabilization by applying bituminous binders on gravel or stone roads having a base thickness of only a few inches. Most stabilization failures are base failures. We should have 8 or 10 inches of consolidated gravel or stone as a base, except where subgrade and drainage conditions are near perfect, before we consider spending considerable sums of money on such surface stabilization. Having seen so many of these surface stabilization projects that have "gone with the winter," it is felt that we are unwise in even considering such procedure until we are sure of adequate drainage and base facilities.

There have been some very successful results in Indiana in base stabilization of gravel and stone roads using surprisingly small quantities of bituminous materials. Excellent results have been obtained in base stabilization to a depth of about six inches



Calcium chloride stabilized New England farm-to-market road

utilizing as little as two per cent of road oils, medium tars and in some cases, light emulsions and medium curing cut-backs. This requires many round trips of the mixing equipment utilizing spike, spring-tooth and disc harrows, power graders, multiple blade maintainers, rotary tillers, traveling pugmills, etc., until the bituminous material is uniformly mixed throughout the aggregate. A little moisture will facilitate this mixing operation, although it can be done in a very dry condition providing sufficient blading is insisted upon. When spread and rolled, this material is rather loose and would not provide a stabilized wearing surface, thus requiring sealing with a heavy bituminous material and stone chips or pea gravel.

The prime function of stabilization is to prevent or greatly reduce the possibilities of the entrance of water into the road itself. Attempt must therefore be made to secure as great a density as possible.

Professor K. B. Woods, Assistant Director of the Purdue Joint Highway Research Project, expressed this

point forcefully in a recent "Highway Hints" article in which he emphasized the proper consolidation at the proper moisture content in order to attain a density which would prevent the entrance of a sufficient amount of moisture to raise the soil fines from the plastic limit to or near the liquid limit. A quotation is as follows:

"Adequate compaction is of prime importance in stabilized mixes where portland cement or bituminous materials are employed as admixtures. In the case of cement, adequate compaction during construction is absolutely essential since no increase in unit dry weight can be obtained after the soil-cement mixture hardens. In the use of bituminous materials in stabilization, the higher the compaction (within practical limits) the more effective is the bitumen in decreasing the tendency of the mixture to absorb water even though the bitumen does have a similar effect at lower degrees of compaction."

Soil-Cement Stabilization

Stabilization with portland cement in Indiana, incorporating eight to 10 per cent by weight, has usually been to a depth of about six inches. Where proportions have been properly determined and mixing and consolidating operations adequate, good results have been attained. The policy has been to surface-treat these consolidated bases to waterproof them and to protect them against the ravelling action of traffic. Costs vary, but some of them have run around \$5,000 a mile.

Same Stabilization Handicaps

One great handicap in the economical construction of low-cost roads has been the tendency of some designers and specification writers to demand high-type design and specification features which, the writer be-



Traveling machine preparing stabilized bituminous mixture on West Virginia road



Dragging or surface smoothing is all-important on earth or other unstabilized roads. When rubber is hard to get, use Dobbin

lieves, are too rigid and too expensive for low-cost road work. If we set out to build a low-cost road with high-cost standards, we will ultimately wind up with a high-cost road, as has been proven in too many cases. We must let down the bars somewhat on quality of materials and standards of workmanship, insisting, of course, that the results justify the expenditures involved.

We have also erred in starting this stabilization construction procedure on roads having bad horizontal and vertical alignment. When once we start stepping up these low-type roads through the various successive stages as traffic increases, we are apt to wind up eventually with a high-type surface on a low-type alignment. This procedure introduces serious accident hazards and to my mind is not justifiable. We should rather sacrifice both time and money in first providing satisfactory vertical and horizontal alignment for these roads on which anticipated future traffic developments may lead us eventually to a high-type surface.

Maintenance Not Eliminated

Do not labor under the delusion that any form of low-cost stabilization will eliminate maintenance problems. It is necessary to surface treat the average low-cost, black-top road every three to five years.

In varying degree, any type of stabilization under certain conditions represents an economical step in our road improvement program. However, in general, stabilization of any kind is somewhat of a luxury. This is true to a certain extent in the case of high-type pavements. Certainly, by

these means we are getting better roads and providing greater comfort and less interruption to traffic, but in getting these benefits we must pay for them.

No road surface has yet been built that did not require some maintenance. About the only road surface type that can be ignored, with no maintenance whatever, and still maintain the same surface type is an earth road. Of course, without maintenance, it will take on some outlandish shapes and may become absolutely impassable, but nevertheless it is still an earth surface.

Danger of Over Expansion

One thing county men must guard against is the danger of stabilizing too many miles of gravel and stone roads. This comes as quite a shock to some who seem to have the idea that the wise thing to do is to stabilize every mile of road in the county. If adequate funds were available, that might be highly desirable for the traveling public and for those unfortunate people who are forced to live alongside unstabilized roads and work, eat, and sleep in the dust kicked up by passing traffic. However, on the basis of economics this could not be justified.

For county highway departments in Indiana, the average annual budget per mile of road is \$160. This must cover construction, maintenance, equipment, and all other county road expenditures. The average Indiana county has 700 miles of county roads.

Stabilized black-topped roads must be re-sealed or given a light surface treatment at least every four years on the average. The cost of this light seal coat would be about \$800 a mile.

Divided by four, this would average \$200 a mile a year. The average county only receives \$160 a mile a year for all of its road work, and there are many other things to be covered by this limited budget besides maintaining black-top surfaces. For instance, keeping the roadsides clear, maintaining adequate drainage facilities, cleaning and painting steel bridges, repairing bridge floors, underpinning abutments and piers which have been undermined by flood waters, keeping up road signs and markers and many other items which call for a considerable part of that \$160 per mile which in itself is \$40 a mile short of merely maintaining the black-top surfaces. The same reasoning applies to chemically stabilized gravel or stone roads, the maintenance of which would run around \$200 a mile a year.

In short, some of our counties have already gone so far in this stabilization program that it is taking most of their road funds to keep up this limited mileage, and several hundred additional miles of unstabilized roads are being sadly neglected.

We must protect the bituminous stabilization investment with prompt and adequate maintenance. Otherwise, in a short time through neglect, the bituminous surface is almost completely destroyed; we will have lost our original investment, and must start all over again with very little salvage except in the base. We can neglect an unstabilized road even for a year or two, and although it may become so rough and bumpy that it is almost impassable, nevertheless the gravel and stone is still there or on the adjacent shoulders. One can go out there a year or two later with a grading outfit, move the gravel or stone back into position, drag it under traffic until it is consolidated, and again have a good, unstabilized road. But if we neglect a stabilized road for a similar period of time, we can not restore it to its original condition without spending an amount about equal to the original stabilization cost.

The writer is one of stabilization's most ardent supporters and promoters. However, he thinks it should be done with judgment and with careful thought and attention to the economy and serviceability of the entire system of roads.

Priorities Instruction.—The Office for Emergency Management, Washington, D. C., has issued a booklet of priorities instructions for contracting, procurement and inspecting officials of the Army and Navy Munitions Board.

Force Account Concrete Pavement Widening Project

AFTER fifteen years of rather heavy traffic the pavement slab on an eighteen-foot concrete pavement, which was completed in April, 1926, through Liberty County on U. S. 90 (formerly State Highway No. 3), was rather badly broken and distorted, and due to a very heavy increase in traffic (the latest traffic count shows 4130 vehicles per day), it was quite apparent that the pavement was of inadequate width. 9-6-9 in. type. Liberty County is in the southeastern part of the state and is located in what is termed the Coastal Plains section. The elevation is approximately fifty feet above sea level, and soil conditions are more or less variable, but in no case are the soils of good quality. On November 20, 1941, the Texas Highway Department passed a minute appropriating \$105,000.00 to widen the existing pavement three feet on each side from Liberty, the county seat, to a point 9.25 miles east, this being the first increment of the proposed program to widen and resurface with asphaltic concrete all pavements of inadequate width from Houston to Beaumont. After



Rough grading, or removing the earth shoulders by means of a power maintainer

widening and mudjacking the existing pavement, it was proposed to cover the entire twenty-four foot width with approximately one hun-

dred pounds per square yard of asphaltic concrete or Uvalde rock asphalt to provide a smooth riding surface and one of uniform texture.

The work order was issued on November 26, 1941, and work was actually started on December 12, 1941. The first work consisted of mudjacking and all of this work was completed prior to the actual placing of the concrete for widening. This latter work was started in January, 1942, and the project at this writing is nearing completion. It is not known at this time if the state will be able to continue with this type of work in view of War Production Board Conservation Order No. L-41, but inasmuch as work on this project had been inaugurated prior to April 9, 1942, operations on this project will be carried to completion.

Transit Mixed Concrete Used

Due consideration was given to all problems involved in the construction



A section of shoulder which has been rough graded, and forms for the concrete pavement carried forward



The concrete batching plant of the Builders Supply Co. of Beaumont. Batches of two cubic yards were batched and mixed in the transit mixers

of the project and inasmuch as the concrete represented the maximum expenditure, it was decided to take bids on transit mixed concrete to determine whether or not this would be the most economical method of placing the concrete. For the project 8,500 cubic yards of concrete were necessary and bids were taken on this amount. A low bid of \$6.75 per cubic yard was submitted by the Builders Supply Company of Beaumont, and this provided for the cost of all materials, hauling and placing in the forms. The design is a four-sack batch based on water-cement ratio.

An inspection was made on the project early in April of this year, at which time the accompanying pictures were taken. The work which had been completed was very satisfactory and excellent progress was being made. On April 1, 1942, the project was sixty-five per cent complete, and it is anticipated that all work will be completed not later than June 1, 1942. Practically all estimated unit costs were being underrun, and as an example, the concrete pavement, which was estimated at \$2.30 a square yard was being placed at a cost of \$2.20 a square yard.

Force Account vs. Contract Method

On a project of this character and size, the question may arise as to why it was not contracted instead of being constructed by force account methods. The department has contracted in many instances this type of work, but during the summer and fall of 1941 contractors' bids ranged from \$2.50 to \$2.75 a square yard, and it was thought that these unit prices were slightly excessive. Such prices may or may not have been caused by the many defense activities in progress in Texas, but difficulties were being experienced in securing

what we deemed fair unit prices. It was decided to use this particular project as an experiment to deter-

mine if this type of work could be performed in an efficient and economical manner by force account



Hand methods were used in fine grading, and in most instances a field sand was used in correcting irregularities and providing a small amount of sand cushion. The inner edge of the widened section was thickened to 9 inches to conform to the original section



A device to hold the reinforcing steel in place. No dowels were used to join the new section with the old



Actual placing of the concrete within the forms from a transit mix truck



A hand operated longitudinal float was used in the finishing operation



The usual canvas belt was in use in the finishing operation

methods, and our observations to date are that it can and is being done.

Responsible Personnel

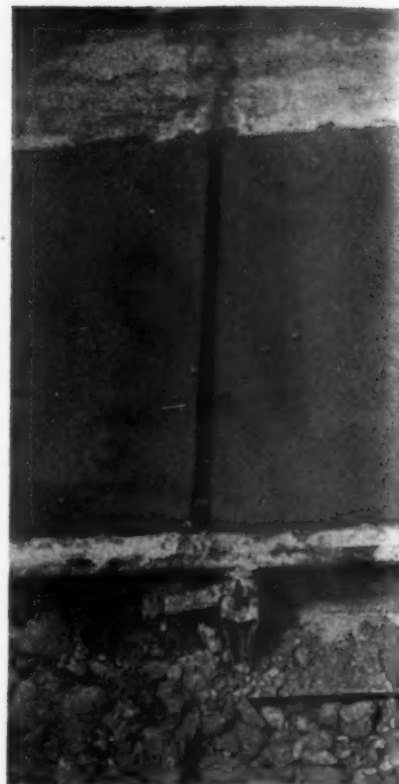
All work in connection with this project, with the exception of the mixed concrete, is being performed with maintenance forces under the direction of E. R. Young, Resident



Straight edging the completed surface



The last finishing operation consisted of edging adjacent to the forms. Engineer. R. T. Pinchback, Jr., Field Engineer, is in direct charge of the project, and B. F. Sullivan is the Job Foreman. Plans and estimates were prepared under the direction of T. J. Kelly, District Engineer at Beaumont, who also exercises general supervision.



A typical expansion joint, and such joints were placed where expansion joints had been placed in the old section



A typical dummy joint, and such joints were placed directly opposite to all major transverse cracks

Design of Highway Sections for War and Post-War Needs

THE complete conversion of highway programs to serve the total war effort is being speeded in every State. The rapidity with which highway organizations are

By WILBUR H. SIMONSON

Senior Landscape Architect,¹ Public Roads Administration, Federal Works Agency

Public Roads Administration as of February 7.

"In designing highway improvements . . . essential to national defense, the basic principles of roadside improvement should be incorporated to the extent practicable. . . . No permanent highway improvement can be considered to be adequate unless basic cross section improvement features are incorporated in construction, together with appropriate seeding, mulching, sodding or equivalent soil protection work on shoulders, gutters and slopes. Experience has demonstrated that protection of bare soil from the action of wind, frost and water may be accomplished at minimum cost by the selection and use of mulches, grasses and other ground covers, and, except in extremely dry climates, such measures should be incorporated in project plans and specifications to the degree necessary, as determined by the State Landscape Engineer."

Cross Section and Ground Cover

The first stage in the construction of a defense highway is, of course, the selection of the best available route



Fig. 1.—Old standard cross-section with narrow shoulders, rough, weed-infested ditches and steep angular back slopes. Continual clearing of clogged drainage combined with necessity for hand labor methods makes maintenance difficult and costly. Photo by courtesy Public Roads Administration

working out necessary adjustments to meet the requirements of war is an index of their contribution to essential highway improvements. The sudden shift in emphasis in national highway projects makes it timely to reiterate and to keep always in mind the point of view, proven by a decade of experience, that basic landscape design is an integral part of economic and safe highway construction and maintenance. This means that now, more than ever before, the fundamentals of highway landscape design should be directly applied to all new construction with effective engineering skill.

As a result of nearly a decade of nationwide experience in the roadside development program, the following policy was incorporated in a memorandum by the Commissioner of the



Fig. 2.—The same highway with cross-section improved to provide wide shoulders, broad smooth gutter drainage, and well-flattened and rounded slopes. Compare the sight distance around the inside of the curve with figure 1. Note the wasteful erosion in the bottoms of the newly-graded gutter section which shows the need for protective ground cover to finish the job. Photo by courtesy Public Roads Administration

¹ This article was delivered by Mr. Simonson as a paper at the Second Ohio Short Course on Highway Development, Ohio State University, Columbus, Ohio, February 27, 1942.



Fig. 3.—The finished road section with rounded and warped slopes and gutters protected by grass. Increased traffic safety, simplified machine maintenance, and a molded highway appearance all justify the universal adoption and more general use of the flexible cross-section design varied to fit different traffic requirements and topographic conditions. Photo by courtesy Public Roads Administration

which will permit directional alignment and favorable road grades. The next step is the design of a well-rounded or streamlined highway cross-section without steep slopes, and with adequate shoulders and gutters. This ground work is the foundation for necessary slope and soil protection measures developed during past roadside development programs.

Rounded and warped earth slope sections make the use of modern mobile machine equipment more effective during initial highway grading and drainage construction as well as in continuing maintenance operations after the highway is finished, as shown in figures 1, 2, 3, and 4.

Designing the cross-section offers an opportunity for each landscape engineer to take advantage of the experience gained through the execution of the one per cent roadside demonstration programs for direct application to the essential protection of wartime work. To this end, the first and most important need is the assembly of typical State specifications covering soil preparation and protection items for adoption and use in each climatic region and administrative district. Improved specifications should be developed on a *flexible working basis* so that field adjustments may be made as local conditions may require during the emergencies of construction. Specifications for mulching, seeding, fertilizing, and other treatments need to be based on an examination of soil, climatic conditions, traffic and other factors affecting the establishment and main-

tenance of grasses on each type and condition of site and soil. This flexible procedure is basic and indispensable at this critical time.

For instance, such items as ground preparation, fertilizing and seeding should be worked out in flexible specification form so that substitutions in fertilizer and seed formulas will be possible when found necessary. Lack of available supply of a particular material specified may require substi-

tutions of fertilizer and seed materials in certain cases, especially under war conditions when nitrogen fertilizers and grass seeds for airfields may at times be difficult to obtain. There may be cases, also, where tests of delivered material show that the requirements of the specifications have not been met. It may be found too late, for instance, to reorder and deliver the required materials without delaying a seasonal operation. Under flexible procedure, seed or fertilizers already on the job may be used at once, and equitable adjustments in measurement and payment may be made in accordance with the specifications.

Another difficulty that flexibility in specifications may help to overcome, is the normal seasonal limitation of the period in which seeding operations may be satisfactorily carried out. It may be possible to extend the normal limitations of season in certain cases through use of recognized compensating operations like mulching or special soil preparation. This is a challenge to the ingenuity and resourcefulness of all highway engineers during this critical period. In order to complete national defense highway projects with the speed required in time of war, every bit of our collective experience must be brought into play.

Materials used should be locally available, with demonstrated ability to meet the requirements of local conditions. Climate, character of topogra-



Fig. 4.—Economical operation of modern machine equipment is facilitated on wide grass protected shoulders and flat slopes. The flexible molded cross-section design and construction of highways has made possible a revolutionary advancement in the efficiency of maintenance operations. This has resulted in the practical application of many improvements in equipment with a substantial saving in maintenance expenditures. Photo by courtesy Public Roads Administration

phy and soils, and availability of local materials are the principal factors that determine the earthwork cross section and soil protection treatment. As you will agree, there is no economic justification for the arbitrary selection of any single type of construction for access roadways to the exclusion of all other types. Neither is there justification for the arbitrary selection of a single type of highway cross section and soil protection treatment for varying topographic, soil and roadside conditions.

Figures 5, 6, 7, and 8 show the interrelation of traffic and topography in cross-section design.

Maintenance Reduction

Adequate defense highway design will include:

- (1) Stabilized earth shoulders of adequate width and pitch, covered with grass where conditions permit;
- (2) Rounded, flat-bottom gutters, protected by grass where practicable;
- (3) O-G cut and fill slopes, mulched, seeded, or planted, to stop needless clogging of drainage channels.

The prevention of snow drifting is also an important consideration where snow is a problem in the design of highways. Any deficiency in widths of right-of-way and of roadway section, and any neglect in the protection of bare soil is bound to result in increased maintenance costs and decreased operating efficiency.

In this connection, the following is the concluding sentence of a paper on Access Roadways, Their Designs and Materials of Construction, presented by Mr. R. E. Toms, Chief of the Division of Design of the Public Roads Administration, at the Twenty-Seventh ANNUAL Meeting of the American Associate of State Highway Officials, September 29-October 2, 1941, at Detroit, Michigan:

"... the problem of maintenance is an important one. This problem can be simplified to the extent possible only by wholly adequate construction that will reduce maintenance to a minimum."

Or as Mr. W. A. Clarke, Divisional Engineer of the Ontario Department of Highways in Canada so pointedly stated the case in "The Canadian Engineer" (pg. 3 of the October 31, 1939, issue):

"It is hardly necessary to point

out that the modern rounded cross-section is essential to low cost maintenance through the use of power machinery" in all maintenance operations. You may find further quotation of Mr. Clarke's positive presentation of the Importance of Cross Section Design of interest at this point:

"If we are designing highways for higher speed through reduction of curvature and grade we must, of course, have a practical cross-section. The cross-section in turn directly affects the width of the right-of-way. The cross-section is of utmost importance to everyone connected with the development of highways whether in construction or maintenance. The tendency, of course, has been to flatten out our cross-sections with only a slight elevation and practically no ditches which, of course, makes for safety and a tremendous reduction in erosion, which is one of our chief sources of maintenance costs. The flat cross-section with a wide right-of-way gives a greater sense of spaciousness, better vision, decreases mental hazard, and increases the sense of safety. The flat cross-section will make for simpler construction, more economical maintenance, and increased esthetic value. The proper

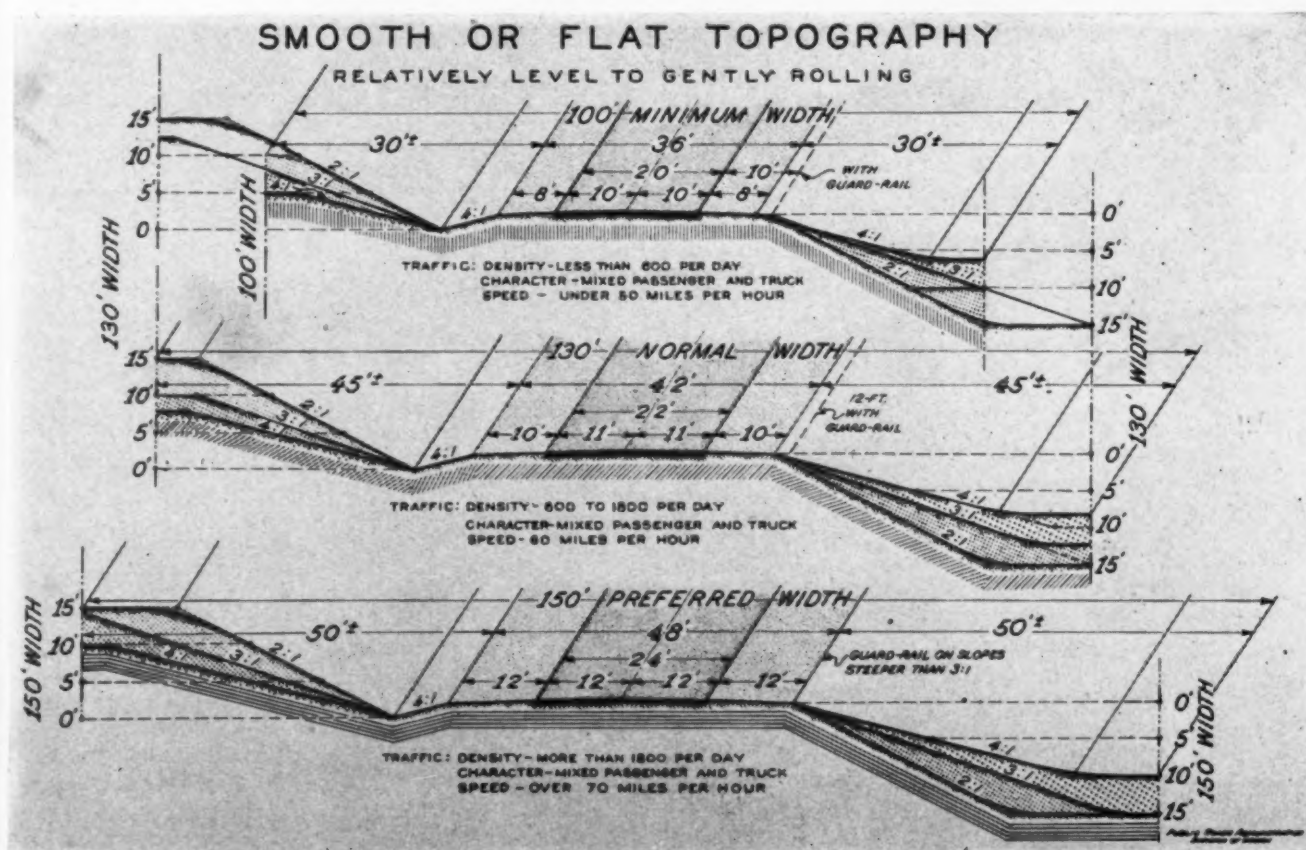


Fig. 5.—In relatively level to gently rolling topography, with cuts and fills ranging up to an average of 10 feet, the majority of earth slopes may be kept sufficiently flat (3:1 and 4:1) to facilitate machine maintenance and to avoid the need for guardrail. A transition zone from 10 feet to 15 feet is indicated between smooth and moderate topography with 2:1 slope ratios if necessary. War limitations on guard-rail suggest greater use of 4:1 or flatter slopes in the design of earth fills

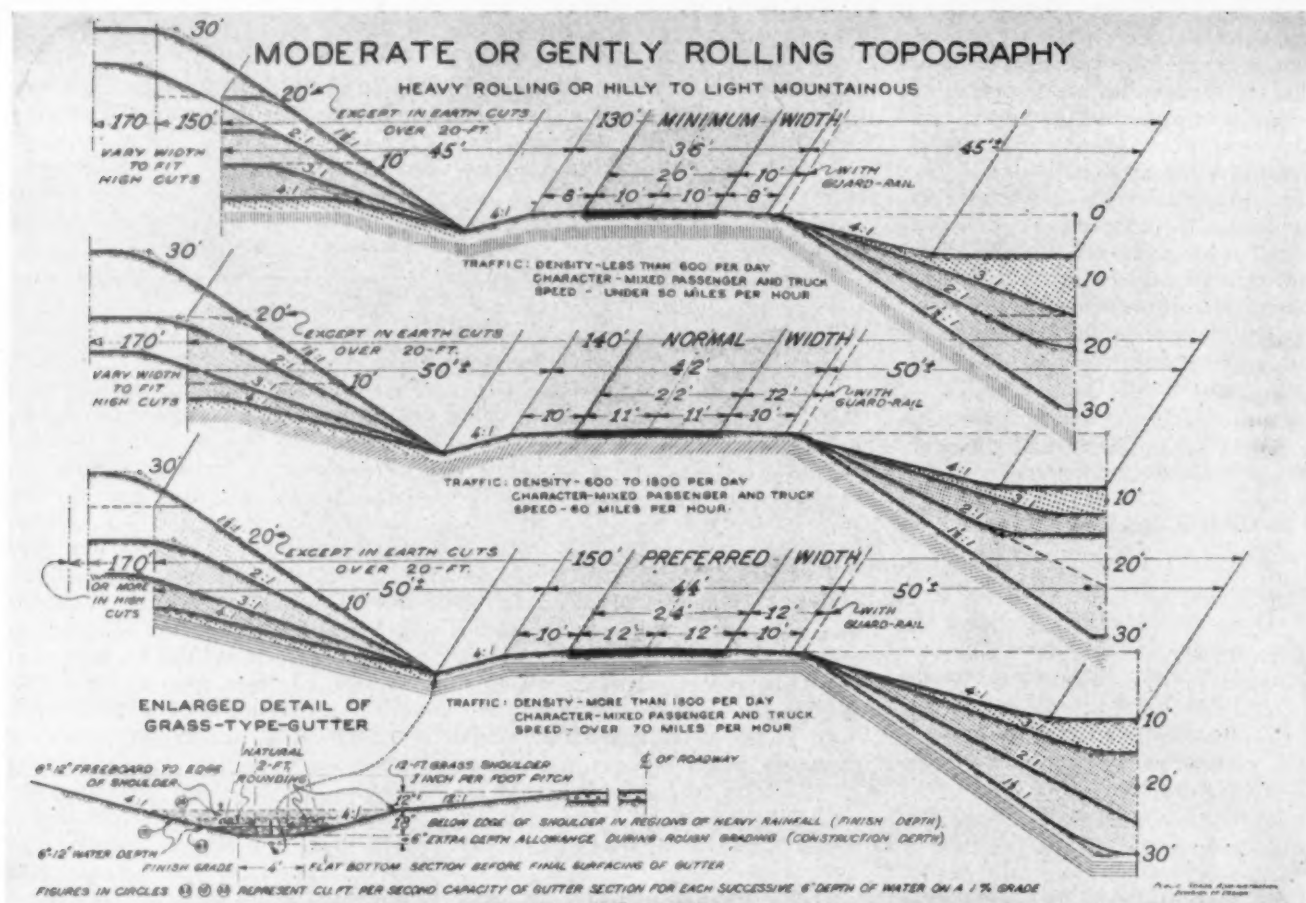


Fig. 6.—Heavy rolling or hilly to light mountainous terrain is classified with majority of cuts and fills from 10 feet to 30 feet high. Note the bands of slope ratios varying from 4:1 to 1½:1 indicated in relation of slope heights

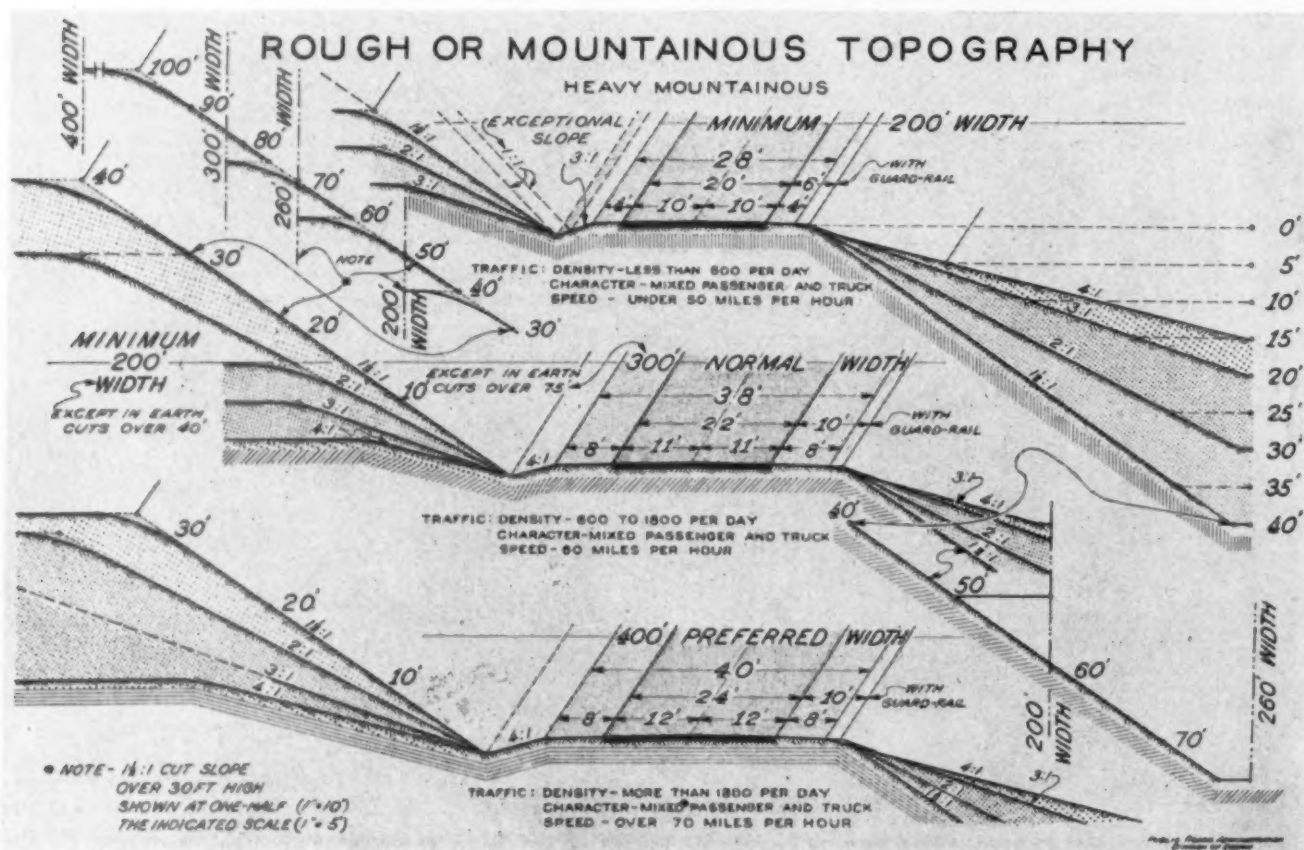


Fig. 7.—In rough or mountainous topography, shoulder widths may be narrower. Heights and ratios of slopes are a more dominant factor in determining the sectional widths of the roadway construction. Average cuts and fills are assumed to range from 30 feet to 60 feet

the engineer too-rigidly following the standards set out."

A comparison of divided highway design types is shown by figs. 9 and 10. Ten years of experience have dem-

onstrated that good roadside improvement and good highway design are one and the same thing. Adequate defense highway construction will include both.



Fig. 10.—A divided highway with variation in width of separation and elevation of surfacings. With influence of topography on future open-country highway design, a more flexible form of divided highway section may be expected, with each of the separated trafficways simply treated as a single rural highway at variable elevations and distances apart, in good relation to each other. Photograph by courtesy Public Roads Administration

Permit to Begin Construction of Municipal and County Projects

The manager of the Municipal and County Highway Officials' Division, American Road Builders' Association, Mr. John A. Long, released the following on April 22, 1942:

I have been informed by the Works Projects Administration that their operation of WPA projects under supervision of municipal and county agencies is proceeding under Conservation Order L-41, prohibiting construction, in accordance with conference agreements between the War Production Board and the Work Projects Administration on all construction work already under way and that any projects involving the placing of surface treatment upon prepared bases, the placing of such surface treatment is not considered new construction but as a completion of the originally planned project.

I am also advised that applications for "a permit to begin construction" wherein WPA funds or project agreements are operative, and the procedure for securing such permit, will be in accordance with the establishment procedure in procurement of priority

ratings for WPA projects, materials, or equipment. [See April issue of *ROADS AND STREETS* for this procedure. Ed.]

A study is being made of the possibility of utilizing the organization of the Work Projects Administration as a recommending agency through which municipal and local road officials may route their applications for permits to begin construction on projects lying outside WPA's participation.

At the present time this responsibility is being assumed by the Public Roads Administration but the indications are that the task will assume such huge proportions that the use of all available federal agencies experienced in highway construction and administration may be invoked.

I will appreciate receiving from municipal and local officials comments, criticisms or suggestions bearing upon these questions in order that I may be able to more accurately portray the wishes of municipal and local governments.

\$100,000,000 Additional Funds Asked for Access Roads

On April 9, 1942, Congressman Wilburn Cartwright introduced a Bill (HR-6908) which would authorize an increase in the appropriation for access roads as defined in Section 6 of the Defense Highway Act of 1941 (S-1580). This bill was introduced at the request of the Federal Works Agency, states a release by the American Road Builders Association.

In the Defense Highway Act of 1941 there was an authorization for \$150,000,000 for access roads (Section 3) and this new bill would merely increase this amount to \$250,000,000.

Brief hearings on the Bill HR-6908 will be held next week and prompt action will probably follow.

For your information the two sections of the Defense Highway Act of 1941 are quoted below.

"Sec. 3. Access Roads.—The Commissioner of Public Roads is authorized to provide for the construction and improvement of access roads to military and naval reservations, to defense-industry sites, and to the sources of raw materials when such roads are certified to the Federal Works Administrator as important to the national defense by the Secretary of War or the Secretary of the Navy, and for replacing existing highways and highway connections that are shut off from general public use by necessary closures or restrictions at military and naval reservations and defense-industry sites. The acquisition of new or additional rights-of-way necessary for such projects may, to the extent determined by the Federal Works Administrator, be included as part of the construction of such projects and Federal funds shall be available to pay the cost of such acquisition. For carrying out the purpose of this section during the continuance of the emergency declared by the President on May 27, 1941, there is hereby authorized to be appropriated the sum of \$150,000,000, which shall be available, without regard to apportionment among the several States, for paying all or any part of the cost thereof."

"Sec. 6. Extension of Federal-Aid System.—Notwithstanding the limitations in Section 6 of the Federal Highway Act, as amended and supplemented, respecting the mileage of the system of Federal-aid highways, such system of highways in any State may be extended to include, and there may be approved as a part of such system of highways in such State, any of the lines of the strategic network of highways."

Decrease in Trend of Traffic Volume Indicated

PUBLIC condemnation in the near future of all unnecessary highway motor travel was forecast by H. S. Fairbank of the Public Roads Administration of the Federal Works Agency, in an address prepared for delivery before the American Society of Civil Engineers, meeting in Roanoke, Va. Mr. Fairbank said that the use of automobiles for recreational and social purposes seems to be showing the first effects of the Government's restrictions on motor vehicles, tires and gasoline. He cited as evidence of a decrease in recreational travel the continuing heavy traffic in cities, linked with a decrease in the movement of motor vehicles on country roads since the Government banned new tire sales last December.

Automatic counters throughout the country show that February, 1942, traffic on rural highways was 7.6 percent less than that of the same month a year earlier, and January travel was only 1.1 percent greater than that of January, 1941. In contrast, rural traffic increased each month of 1941 over the corresponding month of the previous year, with December, 1941, traffic 12.5 percent greater than a year earlier.

Gasoline-consumption figures indicate that motor vehicles continue to be extensively used in cities. Specific records show increases in automobile traffic over the San Francisco bridges and all traffic through the Holland Tunnel and over the George Washington Bridge in New York City.

As further evidence that pleasure travel is declining, Mr. Fairbank cited reports of the Pennsylvania Turnpike Commission that toll-paying passenger cars, which in January were up 10 per cent over the previous January, increased only 1 percent in February, whereas trucks and busses increased 36 and 80 per cent, respectively, in January, and 24 and 50 per cent, respectively, in February.

While predicting further declines in "unessential" travel, Mr. Fairbank emphasized that "large elements of the total highway transport are essential in the highest degree," and that "these essential movements must be safeguarded."

He quoted from a survey of 749 Michigan corporations manufacturing war materials, showing that 70 percent of these firms received 50 percent, 38 percent received 90 percent, and 13 percent received 100 percent of their incoming materials by truck. Seventy-six percent ship 50 percent, 43 percent ship 90 percent, and 15 percent ship 100 percent of their products by truck.

Of the 434,700 workers employed at these plants, 75 percent were reported to travel to work by automobile.

"Definite and prompt measures must be taken to transfer to mass carriers as much as possible of the worker travel in all parts of the country," according to Mr. Fairbank.

The Director of Defense Transportation, he said, has asked the High-

way Traffic Advisory Committee to the War Department, and affiliated committees of the various states, to conduct a nation-wide program to effect this change and to promote other plans for civilian conservation of vehicles, tires, and motor fuel.

"Roads and Streets" Survey

At the time that Mr. Fairbank was making the study from which he obtained the above data, ROADS AND STREETS was making a survey by letter of the various states. The tabulations below are the results gathered by ROADS AND STREETS, which are not complete but are certainly indicative of the traffic trends for January and February.

Notes at the end explain pertinent conditions about figures to which they refer.

Traffic Count				Gasoline			
	1941	1942		1941	1942		
Jan.	13,664	14,612	Approx. Percent Change			Approx. Percent Change	
Feb.	13,945	14,239	+6.9	\$684,148	\$839,694	+22.7	
			+2.1	851,969	766,720	+17.5	
Jan.	421,778	455,359	ARIZONA ²				
Feb.	444,933	479,273	+7.9	8,524 M gal.	9,152 M gal.	+7.2	
			+7.7	8,299 M gal.	8,189 M gal.	-1.2	
Jan.	2,124	2,159	ARKANSAS ³				
Feb.	2,106	2,061	+1.6	\$1,007,435	\$1,289,767	+1.3	
			-2.1	973,674	1,018,846	+1.2	
Jan.	527,414	588,131	CALIFORNIA ⁴				
Feb.	547,288	572,424	+11.5	\$4,561,828	\$5,006,747	+9.9	
			+4.6	4,155,934	5,102,592	+22.6	
Jan.	....	....	COLORADO ⁵				
Feb.	....	....	-10.4	\$430,535	\$520,870	+21.0	
			-18.0	420,350	360,150	-14.2	
Jan.	62,121	66,839	CONNECTICUT ⁶				
Feb.	71,991	67,779	+7.6	27.4	28.8	+5.1	
			-5.9	25.7	25.4	-1.2	
Jan.	Not available	Not available	DELAWARE				
Feb.	Not available	Not available		4,555 M gal.	4,939 M gal.	+8.42	
				4,285 M gal.	4,398 M gal.	+2.64	
Jan.	....	30,801	FLORIDA ⁷				
Feb.	....	32,916	-15.5	\$1,406,647	\$1,534,739	+8.4	
			-23.3	1,472,447	1,274,912	-15.5	
Jan.	Not given	....	IDAHO ⁸				
Feb.	Not given	....	-18.1	\$325,000	\$355,000	+9.2	
Mar.	....	....	-22.7	270,000	265,000	-1.9	
			....	280,000	230,000	-17.9	
Jan.	....	....	ILLINOIS ⁹				
Feb.	....	....	....	\$3,156,690	\$3,515,950	+11.4	
			....	2,972,342	3,112,342	+4.7	
Jan.	29,075	29,556	INDIANA ¹⁰				
Feb.	36,273	33,171	+1.7	\$2,209,447	\$2,581,047	+16.8	
			-8.2	2,139,362	2,303,876	+7.7	
Jan.	Not given	Not given	IOWA ¹¹				
Feb.	Not given	Not given	-4.8	Not given	Not given	Slight decrease	
			-10.4	Not given	Not given	....
Jan.	196,941 (3 wks)	218,163	KANSAS ¹²				
Feb.	306,925 (4 wks)	296,912	+11.1	\$847,506	\$889,701	+5.0	
			-3.2	\$788,559	\$758,095	-1.1	
Jan.	1,380	1,350	KENTUCKY				
Feb.	1,450	1,310	-2.2	Not given	Not given	....
			-9.8	Not given	Not given	....
Jan.	Not given	Not given	LOUISIANA ¹⁴				
Feb.	Not given	Not given		\$1,250,807	\$1,242,129	-0.6	
				1,149,708	1,288,565	+12.1	

MAINE ¹³					
Jan.	....	....	+6.2	....	+11.5
Feb.	....	....	-16.5	....	-0.3
MARYLAND ¹⁴					
Jan.	....	....	+8.5	\$1,239,854	\$1,031,006
Feb.	....	....	-8.4	1,061,286	921,180
MASSACHUSETTS ¹⁵					
Jan.	....	....	+4.1	Not given	....
Feb.	....	....	-11.3	Not given	....
MICHIGAN ¹⁶					
Jan.	8,443	8,753	+3.6	\$2,472,430	\$2,856,858
Feb.	9,067	9,110	+0.4	2,478,220	2,567,685
MINNESOTA ¹⁷					
Jan.	697,332	709,366	+1.7	\$570,098	\$1,091,429
Feb.	849,164	793,934	-6.5	632,875	991,253
MISSISSIPPI					
Figures not available					
MISSOURI					
Jan.	Not given	....	....	\$1,094,435	\$1,112,780
Feb.	Not given	....	....	996,922	838,485
MONTANA ²⁰					
Jan.	163,567 (5 wks)	149,905	-8.3	\$285,811	\$301,742
Feb.	144,433 (4 wks)	117,530	-18.6	324,432	Not available
NEBRASKA ²¹					
Jan.	11,510	10,220	-11.2	\$435,860	\$485,396
Feb.	12,968	10,143	-21.7	423,362	432,812
NEVADA ²²					
Jan.	....	....	+18.0	....	....
Feb.	....	....	+5.0	....	....
NEW HAMPSHIRE ²³					
Jan.	1,046	926	-11.5	\$197,559	\$326,737
Feb.	1,202	898	-25.5	166,731	155,225
NEW MEXICO ²⁴					
Jan.	13,495	13,985	+3.4	\$370,014	\$447,638
Feb.	13,890	12,989	-6.4	376,142	363,159
NEW YORK ²⁵					
Jan.	Data not taken	....	....	Tax not receivable	....
Feb.	Data not taken	....	....	Tax not receivable	....
NORTH CAROLINA ²⁶					
Jan.	Not given	....	-8.3	\$2,362,000	\$2,379,000
Feb.	816,853	748,435	-8.3	2,266,000	1,949,000
NORTH DAKOTA ²⁷					
Jan.	2,330	3,307	+41.9	\$192,879	\$228,916
Feb.	2,791	2,976	+6.6	156,460	193,115
OHIO ²⁸					
Jan.	....	....	0.0	\$3,040,000	\$3,283,000
Feb.	....	....	12.6	Not given	....
OKLAHOMA ²⁹					
Jan.	1,278,006	1,189,284	-6.9	\$898,510	\$980,001
Feb.	1,141,952	1,006,292	-11.9	856,878	814,880
OREGON ³⁰					
Jan.	....	....	-3.0	\$791,285	\$812,785
Feb.	Trend toward decrease	....	....	832,362	832,190
PENNSYLVANIA ³¹					
Jan.	....	....	+7.6	Not available	....
Feb.	....	....	-3.3	Not available	....
RHODE ISLAND ³²					
Jan.	4,764	7,422	+55.7	\$321,691	\$358,149
Feb.	5,145	7,066	+37.3	308,990	299,271
SOUTH CAROLINA					
Figures not available.					
SOUTH DAKOTA ³³					
Jan.	6,460	7,272	+12.5	\$205,158	\$285,720
Feb.	7,196	7,048	-2.0	277,287	287,320
TENNESSEE ³⁴					
Jan.	3,818	4,005	+4.8	\$1,966,895	\$2,111,180
Feb.	4,489	3,630	-19.1	1,652,061	1,775,041
TEXAS ³⁵					
Jan.	335,500	332,750	-0.8	Not available	....
Feb.	316,750	290,000	-8.4	Not available	....
VERMONT					
Jan.	....	....	+16.0	Not available	....
Feb.	....	....	-2.0	Not available	....
VIRGINIA					
Jan.	231,141,098	262,664,840	+4.4	\$1,710,332	\$1,867,051
Feb.	213,180,673	207,412,904	-2.7	1,704,409	1,639,853
WASHINGTON ³⁶					
Non-Defense Area					
End 8th Week	....	....	-4.2	....	+10.5
End 12th Week	....	....	-5.9	....	+7.8
Totals					
1941	707,604	665,965	-5.9	1,292,334	1,393,037
Jan.	....	....	....	\$1,376,348	\$1,609,876
Feb.	....	....	....	1,275,025	1,358,912
WISCONSIN ³⁷					
Jan.	535,074	514,508	-3.8	\$1,441,570	\$1,727,702
Feb.	558,050	480,841	-13.8	1,363,498	1,494,121
WYOMING ³⁸					
Jan.	....	....	-12.3	....	-5.4
Feb.	....	....	-22.7	....	-11.0

¹ Gas tax collections in January and February for gasoline sold in December and January. Traffic data for 10 automatic traffic counters.

² Net taxed gallons of fuel for owners other than public.

³ Traffic is average daily traffic of 31 automatic recorders. Gasoline tax receipts not indicative because of lag in collection of receipts after use of the gas.

⁴ Traffic data for 80 count stations. Collection lag behind levies by about 60 days. After small amount is deducted from net collections for administration costs, approximately two-thirds of the

Note: Municipal and County Officials Return Completed WPB Questionnaire

April 23, 1942.

The following warning notice was sent out by John A. Long, manager, Municipal Division and County Officials Division, American Road Builders Association:

Reference is made to the questionnaire sent out by the Bureau of Governmental Requirements, War Production Board, the latter part of January, 1942.

This questionnaire sought an inventory of highway equipment as follows:

1. All highway or street equipment you are now using, date of purchase, and condition of same.
2. Mileage of roads you are now maintaining.
3. Your contemplated purchases for 1942, including grader blades.
4. What applications for priority rating you have already submitted.

Because of failure to receive replies from a substantial number of state, county and municipal agencies, a follow-up letter was recently sent out by this agency requesting the immediate furnishing of this information.

This information is sought by the Federal government as being necessary to the prosecution of the war, and although the governmental agency requesting this information has not emphasized the fact, its furnishing is mandatory under the War Control Powers Act of June 28, 1940, et seq.

In a conversation with Mr. Louis Levenson, who is in charge of the highway equipment inventory for the Bureau of Governmental Requirements, emphasis upon a complete reply was stressed and it was pointed out that such an inventory must be furnished by each state, municipality and county agency in the country, to meet the requirements of the Federal government.

Those who have failed to furnish this information should do so immediately, for while the responsible Federal agencies are loath to apply the power they possess under the War Control Act, they will be forced to do so unless this information is voluntarily and immediately forthcoming. Not only does the War Control Act require co-operation in furnishing such information but it provides a penalty for failure to co-operate in efforts being made by responsible Fed-

remainder is transferred to the state highway fund. The other one-third is allocated to the various counties for road purposes.

⁵ Gas tax receipts not much value as they always drag traffic generation by 50 to 60 days.

⁶ Traffic figures from automatic recorder stations show average daily traffic. Gasoline consumption is average daily consumption in millions of gallons.

⁷ Count at traffic counting stations. Indicated decrease believed too high when compared with gasoline consumption figures. No count stations on local roads, hence traffic decrease reflects less tourist travel, principally. Figures for traffic are average daily for count stations. Counties in 1942 received gas tax funds, thereby decreasing state highway department income gain to 0.8% for January and 18.8% for February. Gas tax funds used to retire road and bridge debt not included in receipts figures.

⁸ Record of 5 automatic traffic recorders located on state highway system only. Traffic volume for February is related to gas tax revenues for March. Gas tax revenues shown include 20% distributed quarterly to counties and highway districts.

⁹ Comparable traffic figures not available. Tax revenue figures have one month lag. February 1942 tax collection was actually \$140,000 higher than 1941 because of collections held in clearance fund.

¹⁰ Traffic count for average day of month at automatic traffic recorders.

¹¹ Covers 16 primary road and 10 secondary road stations. Weighted average given, $(16 \times 0.33 + 10 \times 11.8) \div 26 = 4.8$ $(16 \times 11.65 + 10 \times 9.37) \div 26 = 10.4$. Gas tax receipts not indicative of traffic because of building up storage which is seasonable.

¹² Data from 10 automatic recorders for weekly volume are added. Tax represents 97% of fuel sales, 3% of fuel sales tax used for administrative purposes of collecting agency.

¹³ Data from 37 control points for traffic gives average daily total traffic.

¹⁴ Military maneuvers would have unbalanced figures, if given.

¹⁵ Traffic change based on one automatic recorder on U. S. 1 near Ellworth, Me.

¹⁶ Traffic figures refer to areas outside of Baltimore area. Gas tax receipts represent sales of previous month.

¹⁷ Records of 10 automatic traffic counters. When receipts are allocated (which they were not at this time) it is impossible to know what amounts are to be used for highway purposes.

¹⁸ At 5 locations—average daily traffic. Detail breakdown of these locations for November, December, 1940; for November, December, January and February, 1941; and for January and February, 1942, show significant trends not shown by totals listed here. Gasoline tax collected about a month after gasoline is consumed explains discrepancy. March gas tax will be about 7% below March, 1941.

¹⁹ Traffic data from recorders at 20 points for January and 23 points for February. Figures are total for stations for each month. Large gas tax receipts increase not indicative of travel due to increase in gas tax May 1, 1941 and holding smaller reserve for refunds. Receipts not reported until about two months after shipments are received.

²⁰ Weekly traffic is recorded on automatic recorders on 7 primary roads and 4 other roads.

²¹ Traffic shown is adjusted daily average totaled for 10 stations. Gas tax rate was increased for 1942 from 50% of a 5c tax to 66 2/3% of a 4c tax which latter is 2 13/20c per gal.

²² Traffic recorders over sections of the state. Around Las Vegas traffic is three or four times a year ago. Reduction over rest of state.

²³ Two automatic traffic recorders total daily average of those two. There is a month's lag in tax receipts. Moneys for debt service from gas taxes not included. Cash receipts do not reflect traffic.

²⁴ Traffic shown is total of 10 stations of average daily traffic. Army traffic probably affects 1942 figures. Tourist traffic increased, however.

²⁵ Highway department does not receive any gasoline tax usable for highway purposes. Tax receipts go to general fund. Highway money appropriated by Legislature.

²⁶ Date from 17 of 20 stations. 3 stations in military areas not included. Gas receipts are for January and February consumption collected in February and March, respectively.

²⁷ Average daily traffic for all days of each month based on 10 automatic counters, added together.

²⁸ Tax receipts shown do not include refunds, nor tax on fuel used by government. Neither is Ohio 1st tax on liquid fuel, which goes into general fund, included. Of the amounts shown, 56.25% is for use of Ohio Dept. of Highways, 25% for county and township roads, and 18.75% for municipal streets. Traffic recorded is relative monthly density.

²⁹ Traffic data based on 20 automatic counters on primary system, figure is sum of all counters. On June 1, 1941, the gas tax was increased 1 1/2c per gallon. 1941 gas tax figures shown are 70% of total collection since that is part going to state highway fund. 1942 figures are only 50.91% of total allocation and is state highway fund portion of total collections.

³⁰ 88.32% of gross receipts used for highways and is prorated figure shown. The 1942/1941 January ratio based on Thursday 8-hour (8 A.M. to 4 P.M.) traffic volumes obtained at 105 locations. Total of all roads shows 1942 traffic is 97% of 1941.

³¹ Data based on 28 automatic recording stations.

³² Traffic data based on 4 automatic recorders and is total of same for average daily traffic. 1941 figures of Recorder No. 4 abnormally low in 1941 due to construction.

³³ Receipts shown are only state highway portion of all collections and are not indicative of traffic since lag of month or so and vehicle registration fees also, are included. Traffic figure is total of recording stations showing adjusted daily average.

³⁴ Traffic at 4 points added, gives average daily. Lag in gas tax receipts, so far as traffic is concerned is not indicative.

³⁵ Traffic added at 28 recording stations showing average daily.

³⁶ The traffic results shown are the differences between the accumulated volumes at each of the permanently located traffic counters, 5 in Non-defense area, and 6 in Defense area. Gas receipts indicate previous months travel due to collection lag. Gross 5c tax receipts earned during the previous month, less refunds. To derive the net amount available for highway purposes, deduct \$2500 per month for collection costs and 8% for non-highway bond retirement. The net amount divided is as follows: Aid to cities, 15%; aid to counties, 41 1/2%; remained for state highways, 43 1/2%. State highway department is allowed 1 1/2% of city and county shares for supervision of the work on city streets and county roads.

³⁷ Traffic represents sum of average daily total at 10 recorders on 9 highways. One road is dual highway.

³⁸ Average of 3 recorders. Tax receipts refers to gasoline used or stored.

eral agencies in behalf of the prosecution of the war. Therefore, if you have not sent in this information, do so at once. If you have misplaced the form letter, furnish the information sought in the above noted four questions and thereby provide the cooperation which local governments have repeatedly pledged.

Priorities System Changed

A fundamental change in the Priorities System has been announced by J. S. Knowlson, Director of Industry Operations. Between April 1st and June 30th most of the blanket rating orders will be revoked or allowed to expire and all who have been operating under them will be required to apply for priority assistance under the PRODUCTION REQUIREMENTS PLAN.

Under P.R.P., the manufacturer makes a single application for priority assistance covering all of the estimated materials needed over any three months period. He must submit full information as to inventories, the end use of his products, etc., etc. Priority ratings are then assigned on the basis of each individual application that should obtain specific quantities of materials during that quarter sufficient for our war efforts and after that the essential civilian needs.

If, for certain reasons, additional quantities of materials are needed, interim applications may be filed. A Modified Production Requirements Plan PD-25X has been developed to meet the needs of firms whose business is less than \$100,000 a year.

The effect of placing virtually all of American industry, including producers who supply the Army and Navy, under the P.R.P., will be to give the War Production Board and the Construction Machinery Branch closer control of the distribution and use of all scarce materials. The most important raw materials, such as aluminum, copper, tin, steel plates, etc., are already allocated at the producer's level. General use of the Plan will provide control of the flow of these materials down to the level of end products.

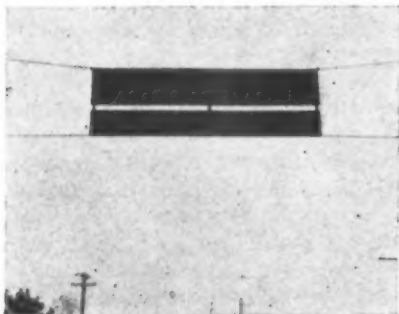
P.R.P. is not a new and untried program—it grew out of the old Defense Supplies Rating Plan announced a year ago. A considerable number of our companies have been operating under this and this letter is to emphasize that it is mandatory by July 1st and a wise war-time solution as it should gear our whole American economy into the War Program most effectively.

OBSERVATIONS BY THE WAY

By
A. PUDDLE JUMPER



¶ This sign hangs over one of the primary roads of Texas. While it advises the motorist of a constriction in the road, I believe "Admiral" Van London, District Engineer, employed



this strategem as a subtle reminder of a deficiency that should be corrected. This is a method of indirect advertising that should produce results.

¶ "Blackout" paint should be applied on the outside. This is based on reports from aviators that even moonlight reflected from glass provides guides for bombing raids. Paint applied on the outside eliminates this reflection. A special blackout paint is claimed to be easily removed . . . simply by wiping off with inexpensive solvent . . . making expensive scraping unnecessary.

¶ Most people favor anything which promises to return something for nothing, or much for little.

¶ Americanism at work is readily discernable to one who looks into the functioning of the Construction Machinery Branch of the Division of Industry Operations of WPB. Here committees of peace time competitors are pooling their information and their best men in working out the production-demand problems created by our entry into the war. The

Branch's efforts are crystallizing and the four Sections (Track Laying Tractor Section, Industrial Internal Combustion Engine Section, Excavating and Grading Machinery Section, and Construction Equipment Section) are functioning.

¶ Green snow, found in Yellowstone Park, is caused by tiny green plants that grow in snow.—*Whitcombings*.

¶ There should be some kind of a service stripe for the young Negro draftee of the 50th training battalion who brought his Lieutenant Colonel up with a start one night, when on guard, with the challenge: "Halt! Look who's here!" — *The Yellow Strand*.

¶ Lumber impregnated with chemical salts and creosote is being widely used as a structural material in place of steel and concrete. Such treated wood is rot-resistant to a degree rivaling other materials in permanence. Witness the long time use of preserved wood for railroad ties and bridge timbers, the features of termite repelling cleanliness, lack of odor and ease of painting. Wood treated with chromated zinc chloride has a substantial degree of resistance to fire.

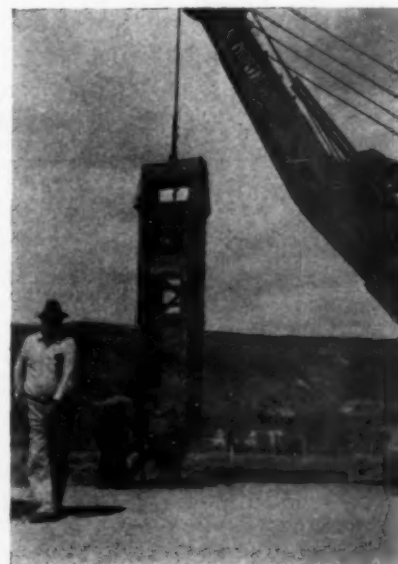
¶ Maybe you think you know most of the strategic materials the government is trying to conserve. But have you heard of these? . . . tragacanth, dragons blood, abaca, kapok, karaya, sisal, henequen, damur, kauri, vetivert and ylangylang. "The Ohmite News" reveals that these are on the government's strategic materials list.

¶ Kansas has just published a colored map of the state on the reverse side of which are colored pictures of things to be seen in the state. I think

the map should have shown Old Trails, Points of Historic Interest, and other points of note by symbol on the road map side.

¶ New fluorescent lamp fixtures are adjustable to individual lighting problems through a wide variety of flexible arms and an assortment of bases and clamps which permit attachment of the fixtures to almost any piece of equipment. They secure greater efficiency from workers and save time in operations. These lamps are available in numerous models. All are of the small, portable type, using one fluorescent tube of either 15 or 20 watt size.

¶ The device suspended from the shovel boom is a post hole bull punch. It was used to set guard rail posts on the newly completed Rio Grande



canyon road in New Mexico. A weight of 2000 lb. drives the steel point (the size of the post to be set) into rocky or soil embankments.

BUCK STEW NIGHT.....



Each year during the deer season (not deer season because it lasts too long) the boys of the Bridge Department of the California Division of Highways foregather for "Buck Stew Night." The cartoon herewith depicts

a typical evening. The gang is supposed to get stewed buck during the course of the fracas, but methinks they get stewed themselves, instead. These gatherings help to break down formality and promote friendship

in the same way as do the fish fries of Mississippi, the skeet field days of Maryland, the annual picnics of Texas, and the contractors' jambourees of Wisconsin. The entertainment is varied and enjoyed by all.

Wet Subgrades Their Cause and Cure

By H. E. COTTON

Drainage Engineer
Armco Drainage Products Association

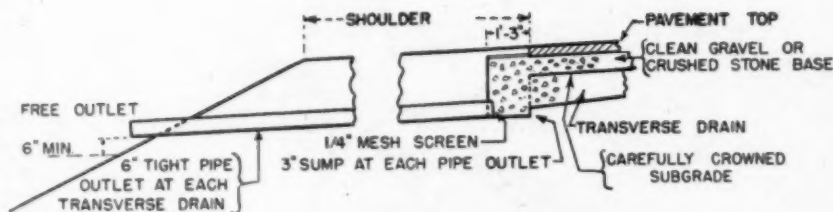
MOISTURE in the subgrade of a pavement is either from ground water or from surface water or from both. In many cases where free ground water exists and the subgrade soil is clay, it is difficult to say which is the predominating source. However, if the free ground-water zone is within capillary rise distance of the subgrade, proper sub-drainage is needed. Surface water reaches the subgrade through joints, cracks, at the edge of the pavement and in some cases through the voids in the pavement itself.

Wet subgrades cause frost heave, mud pumping and weak base support. Water on top of bases containing clay causes bituminous surfaces to lose bond, crack and ravel. Also, it is the opinion of some that water in contact with the underside of the slab causes disintegration of concrete pavements.

Base Drainage

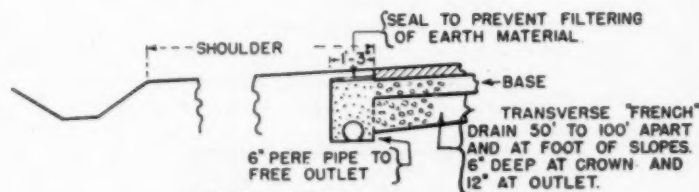
All pavements leak during most of their life and when laid on soils, such as clays and gumbos, a provision should be made for the escape of the water as rapidly as possible. When the subgrade soils are such that they become unstable upon the absorption of moisture, inadequate support for traffic is the usual result. The initial cracks may be few and small but these increase the leakage which further weakens the support and thus the destruction of the pavement progresses rapidly once the damage is started. Under such conditions, bituminous hot-mix pavements have been known to be damaged to the extent of requiring extensive patching within the first year of their life. Likewise, concrete pavements have been known to be damaged almost beyond repair within five years.

It is not sufficient to construct pervious bases unless proper outlets exist, or are provided, for the escape of the free water. When the subgrade soils are pervious and have natural subdrainage, no artificial outlets are necessary. The difference in the behavior of pavements with natural sub-



DESIGN 1

WHERE FREE OUTLETS ARE AVAILABLE AT EACH TRANSVERSE DRAIN.



DESIGN 2

WHERE FREE OUTLETS ARE NOT AVAILABLE AT EACH TRANSVERSE DRAIN.

Fig. 1.—Base Drainage

grade drainage and those having impounded water in their bases, due to impervious subgrades can be observed on many roads.

Hundreds of miles of concrete pavements laid on clay soil bases are being destroyed because of impounded water under the slab which enters through the top or at the side. Likewise hundreds of miles of bituminous pavements with pervious bases on clay subgrades are being destroyed because of impounded water.

A permanently sealed surface which will eliminate roof leakage seems to be impossible. Therefore, the problem is that of preventing the absorption of excessive moisture by clay subgrades by providing a rapid exit for the free water. A method for accomplishing this is suggested in figure 1.

The base should be pervious so that water will readily flow through it to the side trenches. The subgrade should be carefully shaped to eliminate pockets in which water may be impounded. It might be advisable to increase the crown of the subgrade which would result in a thicker pervious base at the edges than at the center.

To hasten the exit of water, trans-

verse drains are suggested to intercept longitudinal flow. It is also suggested that the slope of the bottom of these drains be greater than that of the surface crown. Inasmuch as these drains are covered by the pavement, it is believed that they will function satisfactorily.

Stone bleeders are not satisfactory because ditch and shoulder maintenance operations cause fine material to filter in from the top. In Design 1, a pipe outlet is recommended in fill sections or where permanent free outlets can be obtained in ditches. However, ditch outlets are seldom permanent and should not be used.

Design 2 is preferable in all cases especially in cut sections for three principal reasons: first, because a pipe is infinitely better as a water carrier than crushed stone; second, because outlets can be located and constructed so that they will not be disturbed by maintenance; third, because a finely graded backfill can be used in the longitudinal trench (parallel to the edge of the pavement) which will eliminate filtering in of the shoulder soil. The proper grading of this backfill is discussed under "Subdrainage."

It takes the
SHOCK
OUT OF
ROCK



*** NEW HYDRAULIC CLUTCH**

*** New Hydraulic Clutch—**

- (1) Greatly improves "hanging-on" performance
- (2) Cushions and protects against severe impacts

The 2-yd. Lorain-82, equipped with hydraulic (fluid) clutch, is the closest approach to a steam machine in smoothness and "never-say-die" power control of any clutch type unit to date. You can't stall the engine under any digging circumstances. The severe shocks and impacts inevitable with rock digging are cushioned and absorbed, eliminating costly stresses and strains on the mechanism and cables. The hydraulic coupling may be "de-clutched" and its drag positively eliminated to stop the machinery for lubrication or adjustment.

You can wade into rock confidently with a Lorain-82 with the assurance that its power and digging force will "hang on" relentlessly until the most unyielding rock is in the dipper—and at the same time the hydraulic clutch will provide an automatic check against destructive impacts and shocks. Write today for complete details on the Lorain-82 and this newest machine-and-money-saving feature.

THE THEW SHOVEL COMPANY
 LORAIN, OHIO



2-YD.
LORAIN-82
 WITH HYDRAULIC CLUTCH

Mud Pumping—Its Causes and Effects

Pumping action takes place when water is impounded between the pavement slab and the subgrade. The subgrades are usually impervious but decided pumping has occurred on pervious subgrades when completely saturated. Also pumping is said to occur when water is impounded between a frost layer and the pavement slab during a spring thaw.

The water enters from the surface through joints and cracks and through the shoulder at the edge of the pavement.

Usually the trouble starts at a transverse joint. The subgrade support is weakened by water entering through the joint and heavy loads cause a slight deflection of the slab leaving a very thin space into which more water enters. As traffic hits this spot, the thin sheet of water is forced forward beyond the joint and out at the edge of the slab carrying soil with it. Repetition of this action increases the void under the slab. This causes the slab to crack just beyond the joint and more water is allowed to enter. Once this state is reached, its progress becomes more rapid. At first only slight movement of the slab may occur under the heaviest trucks but many cases have been observed where the damage has progressed to the point where light passenger cars cause pronounced pumping.

As discussed under "Base Drainage" the answer seems to be that of providing a medium for the rapid exit of the water. On new construction, Design 2 with a transverse drain under each expansion joint would be preferable.

In maintenance work, the saving of a concrete pavement on which mud pumping has started is a problem which has not been satisfactorily solved. The usual procedure is to surface with a bituminous treatment with the idea of sealing the top. The success of such surfacing depends upon conditions, but usually the short extension of life does not justify the cost. Drainage at the edge of the pavement as in Design 2 would, no doubt, be very helpful as it would prevent the entrance of water at the edge; but it would not guarantee against trapped water under the slab if no medium exists through which water can flow to the drain.

Subdrainage

Subdrainage is needed when a pervious subgrade soil is saturated with free water or when a free water zone feeds sufficient capillary water to

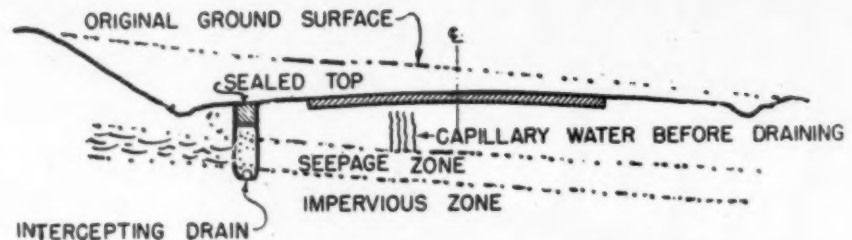


Fig. 2.—Intercepting subdrain to prevent effective capillary rise from a sidehill seepage zone

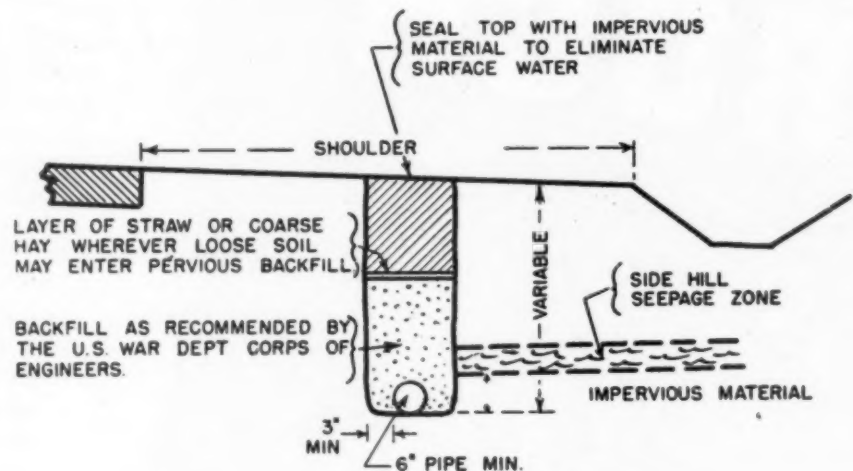


Fig. 3.—Intercepting subdrain (side-drain) for highways

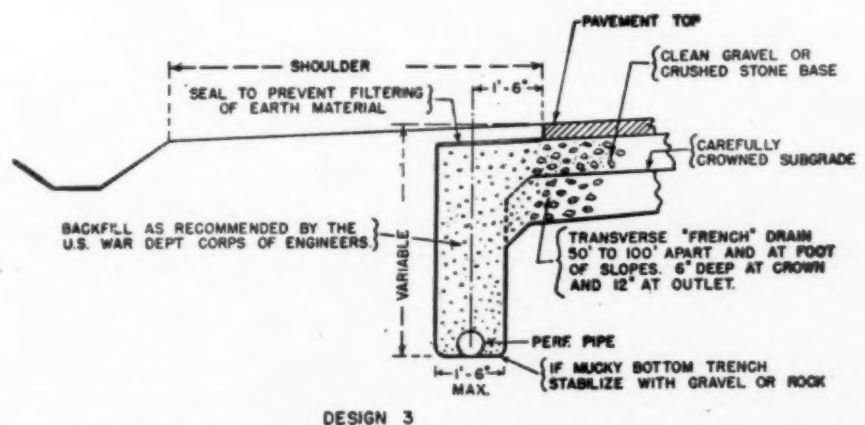


Fig. 4a.—Combined subdrainage and base drainage; preferred where pavement will not be widened

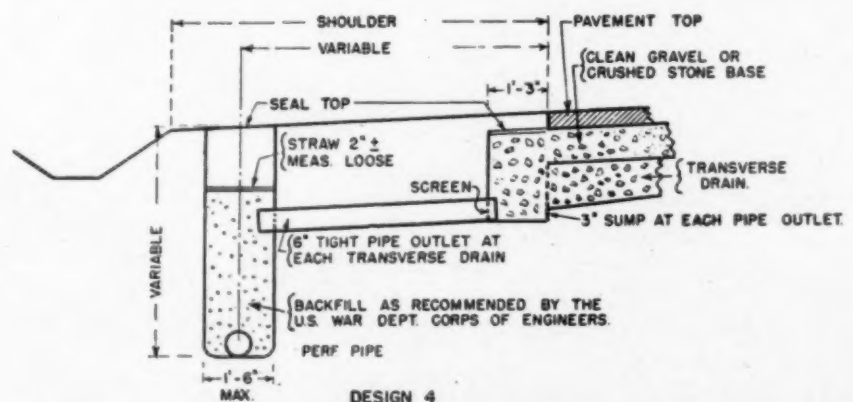


Fig. 4b.—Combined subdrainage and base drainage; may be advisable where pavement may be widened

Patent Rights	
Date	Number
8-14-28	1,680,923
6-11-29	1,716,872
2-11-30	1,746,570
4-7-31	1,799,269
11-10-31	1,831,153
2-20-40	2,190,748

Also Foreign Patents



Trade Mark

Patent Rights	
Date	Number
6-1-27	1,586,991
4-24-28	1,667,253
3-29-32	1,851,339
4-24-28	1,667,252
10-7-29	Re. 17,452
7-21-36	2,048,151

Other Patents Pending

WILLIAMS "SUPER-HI" TENSILE TIE RODS (Elastic Limit or Working Load 4 Times as High as Mild Steel)

INEXPENSIVE U. S. STANDARD THREAD RODS

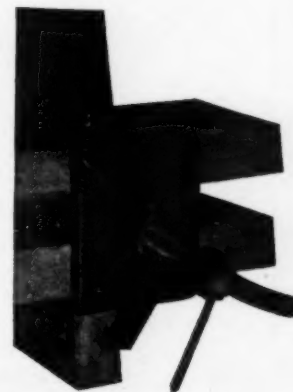
Immediate 24-hr. Service			(2) 3/4" diam. U. S. — 16 thd.			(3) 1/2" diam. U. S. — 13 thd.			(4) 3/8" diam. U. S. — 10 thd.		
PHONE 3-3823 DAY or NIGHT (Wire or phone Collect on orders of \$100.00 or more)			9,500 lbs. Ultimate Tensile 7,500 lbs. Working Load per Rod			16,500 lbs. Ultimate Tensile 13,000 lbs. Working Load per Rod			26,500 lbs. Ultimate Tensile 21,000 lbs. Working Load per Rod		
LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width
12" or less	\$ 3.00*	15" or less	12" or less	\$ 4.00*	15" or less	12" or less	\$ 5.75	15" or less	12" or less	\$ 5.75	15" or less
13"	3.25	16"	13"	4.33	16"	13"	6.25	16"	13"	6.25	16"
14"	3.50	17"	14"	4.67	17"	14"	6.75	17"	14"	6.75	17"
15"	3.75	18"	15"	5.00	18"	15"	7.25	18"	15"	7.25	18"
16"	4.00	19"	16"	5.33	19"	16"	7.75	19"	16"	7.75	19"
17"	4.25	20"	17"	5.67	20"	17"	8.25	20"	17"	8.25	20"
18"	4.50	21"	18"	6.00	21"	18"	8.75	21"	18"	8.75	21"
19"	4.75	22"	19"	6.33	22"	19"	9.25	22"	19"	9.25	22"
20"	5.00	23"	20"	6.67	23"	20"	9.75	23"	20"	9.75	23"
21"	5.25	24"	21"	7.00	24"	21"	10.25	24"	21"	10.25	24"
22"	5.50	25"	22"	7.33	25"	22"	10.75	25"	22"	10.75	25"
23"	5.75	26"	23"	7.67	26"	23"	11.25	26"	23"	11.25	26"
24"	6.00	27"	24"	8.00	27"	24"	11.75	27"	24"	11.75	27"
Price per add'l inch	\$.0023	Figure Rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple	Price per add'l inch	\$.0031	Figure Rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple	Price per add'l inch	\$.0046	Figure Rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple	Price per add'l inch	\$.0052	Figure Rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple
Price per add'l foot	\$.0276		Price per add'l foot	\$.0372		Price per add'l foot	\$.0552		Price per add'l foot	\$.0552	
Price per add'l 100 ft.	\$ 2.76		Price per add'l 100 ft.	\$ 3.72		Price per add'l 100 ft.	\$ 5.52		Price per add'l 100 ft.	\$ 5.52	
Lengths over 20'0" add for Williams High Tensile Couplings per 100			\$ 3.75			Lengths over 20'0" add for Williams High Tensile Couplings per 100			\$ 4.75		
									Lengths over 20'0" add for Williams High Tensile Couplings per 100		
									\$ 5.75		

*Rods under 12" in length curled to prevent turning in concrete.
Send us your plans: We figure the ties, showing locations, etc.

Williams Form Engineering Corporation
46 E. Hall St.
Grand Rapids, Michigan

Williams Adjustable—Vibra-Lock—Standard Clamps—High Tensile

Number	For Inner Rod Size	Acme Thd Waler Rod Length	Bracket Size	Ordinary Mild Steel Maximum Allowable Working Load to Elastic Limit (Not Used)	USING WILLIAMS HIGH TENSILE RODS		Price Per Set 2 Waler Rods 2 Wing Nuts 2 Brackets
					Tensile Strength Ultimate	Maximum Allowable Working Load to Elastic Limit	
US-VL-1	3/4"	18"	(B-2) 3 1/2"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	\$1.25*
US-VL-2	3/4"	24"	(B-2) 3 1/2"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	1.38
US-VL-3	3/4"	30"	(B-2) 3 1/2"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	1.50
US-VL-4	3/4"	36"	(B-2) 3 1/2"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	1.60
US-VL-5	1/2"	20"	(B-3) 4"x5"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	1.55*
US-VL-6	1/2"	24"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	1.65
US-VL-7	1/2"	28"	(B-3) 4"x5"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	1.65
US-VL-8	1/2"	32"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	1.75
US-VL-9	1/2"	36"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	1.90
US-VL-10	1/2"	40"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	2.05
US-VL-11	5/8"	22"	(B-5) 5"x6"	5,000 Lbs.	25,000 Lbs.	20,000 Lbs.	1.85
US-VL-12	5/8"	26"	(B-5) 5"x6"	5,000 Lbs.	25,000 Lbs.	20,000 Lbs.	2.20
US-VL-13	5/8"	30"	(B-5) 5"x6"	7,000 Lbs.	35,000 Lbs.	28,000 Lbs.	2.40
US-VL-14	5/8"	34"	(B-5) 5"x6"	7,000 Lbs.	35,000 Lbs.	28,000 Lbs.	2.70
US-VL-15	5/8"	38"	(B-5) 5"x6"	9,000 Lbs.	45,000 Lbs.	36,000 Lbs.	2.65
US-VL-16	5/8"	42"	(B-5) 5"x6"	9,000 Lbs.	45,000 Lbs.	36,000 Lbs.	2.90
US-VL-17	5/8"	46"	(B-5) 5"x6"	9,000 Lbs.	45,000 Lbs.	36,000 Lbs.	3.15



WM'S VIBRA-LOCK CLAMP REMOVAL

Locked to Waler Rod by 20 or 30 penny Spike engaging slot in rear of Wing Nut and cross drill in Waler Rod.

Buy a Clamp with a Market Value
Direct Trade-In Value of Used Williams Clamps
Toward New

3 years old or less 50% allowance on equal amount New Sets.
3 to 6 years old 40% allowance on equal amount New Sets.
6 to 9 years old 30% allowance on equal amount New Sets.
9 to 15 years old 25% allowance on equal amount New Sets.
15 to 20 years old 20% allowance on equal amount New Sets.
(Turn-in Clamps must be in reasonably good condition)

*Popular sizes.

Waler Supports \$7.50 per 100.

High Tensile
Tie Rod
Couplings

Rod Size	Price Per 100	Price Per 1000
3/4"	\$3.75	\$35.00
1/2"	4.75	45.00

5/8" and larger, prices submitted on request.

Ask for information (pamphlet No. 47) on Williams "Blitz" Wire Tie. It's Fast. It's New. It's the only Spreader Wire Tie that can be pulled for reuse. Can be used with wedges, buttons or Wm.'s "Fly-Nut type Ty-Holders." Price at \$3.00/100 up.
WHEN ORDERING WIRE TIE STATE
Size Waler.....Stud.....Shooting..... Give exact dimensions from inside of sheathing to outside of stud.

A Good Clamp Is a Good Insurance Policy

WILLIAMS FORM ENGINEERING CORP.

Box 925, Madison Square Station

GRAND RAPIDS, MICHIGAN

ROADS AND STREETS, May, 1942

cause subgrade instability. To be efficient, the drains must be so placed that all such damaging free water is intercepted or removed. This requires a thorough investigation of the underground conditions.

The free water zones on highway work usually slope in the general direction of the natural ground surface and therefore are called sidehill seepage zones. They are seams of pervious material of varying thickness between more impervious materials and may be full of flowing water all or just part of the time. In Figure 2 is shown a typical sidehill seepage condition and the location of the drain to intercept and remove the water. Such a drain is commonly called a side drain or an intercepting subdrain. Its essential features shown in detail in Figure 3 are:

- 1—Drain placed below the seepage zone and into the impervious zone so as to trap any water and cause it to enter the pipe.
- 2—A finely graded pervious backfill to prevent silting as recommended by the U. S. War Department Corps of Engineers.
- 3—A sealed top to prevent the entrance of fine material into the pervious backfill.

The necessity of items 1 and 3 are self-evident, but there is much disagreement on the proper size of the backfill. I have been recommending for a number of years the approximate grading of 80 per cent between $\frac{1}{4}$ in. and $\frac{1}{2}$ in., 95 per cent passing $\frac{3}{4}$ in. and 95 per cent retained on a number 10 sieve and it has been quite widely used. Many engineers are still of the opinion that 1 in. to 3 in. stone should be used. Occasionally I am told that a drain located at so-and-so has ceased to function and that the backfill is either known to be or is supposed to be silted up. Invariably the fact is that large size backfill was used. *In the light of recent experiments, I am convinced that the backfill should be even finer than our past recommendations, especially where cohesionless fine sands and coarse silts are encountered.*

An experimental investigation of protective filters was made by G. E. Bertram, a report of which was published by Harvard University, Soil Mechanics Series No. 7, January, 1940. A protective filter is a pervious material which will allow the infiltration of water but will eliminate the entrance of soil into the filter. Further experiments were made by the U. S.

War Department Corps of Engineers at Vicksburg, Miss. The filler material used at Vicksburg was reported to be as follows:

100 per cent passing	$\frac{3}{8}$ "
98 per cent passing	Tyler No. 3
66 per cent passing	Tyler No. 4
51 per cent passing	Tyler No. 6
40 per cent passing	Tyler No. 8
32 per cent passing	Tyler No. 10
24 per cent passing	Tyler No. 14
15 per cent passing	Tyler No. 20
2 per cent passing	Tyler No. 28

As a result of these tests, the War Department Office of the Chief of Engineers issued, on December 18, 1941, a directive on "Limiting Gradation for Backfilling Surrounding Drain Pipe." Because the pertinent facts and recommendations contained in the directive are tremendously important in the subdrainage field, it is given in full at the end of this article.*

Combined Subdrainage and Base Drainage

When conditions require both types of drainage, the designs shown in Figure 4 are suggested. The recommendations discussed above for base

* This article was presented as a paper before the Utah Highway Engineering Conference at the University of Utah in February, 1942. It is published by permission of Prof. A. Diefendorf, Head, Civil Engineering Department.

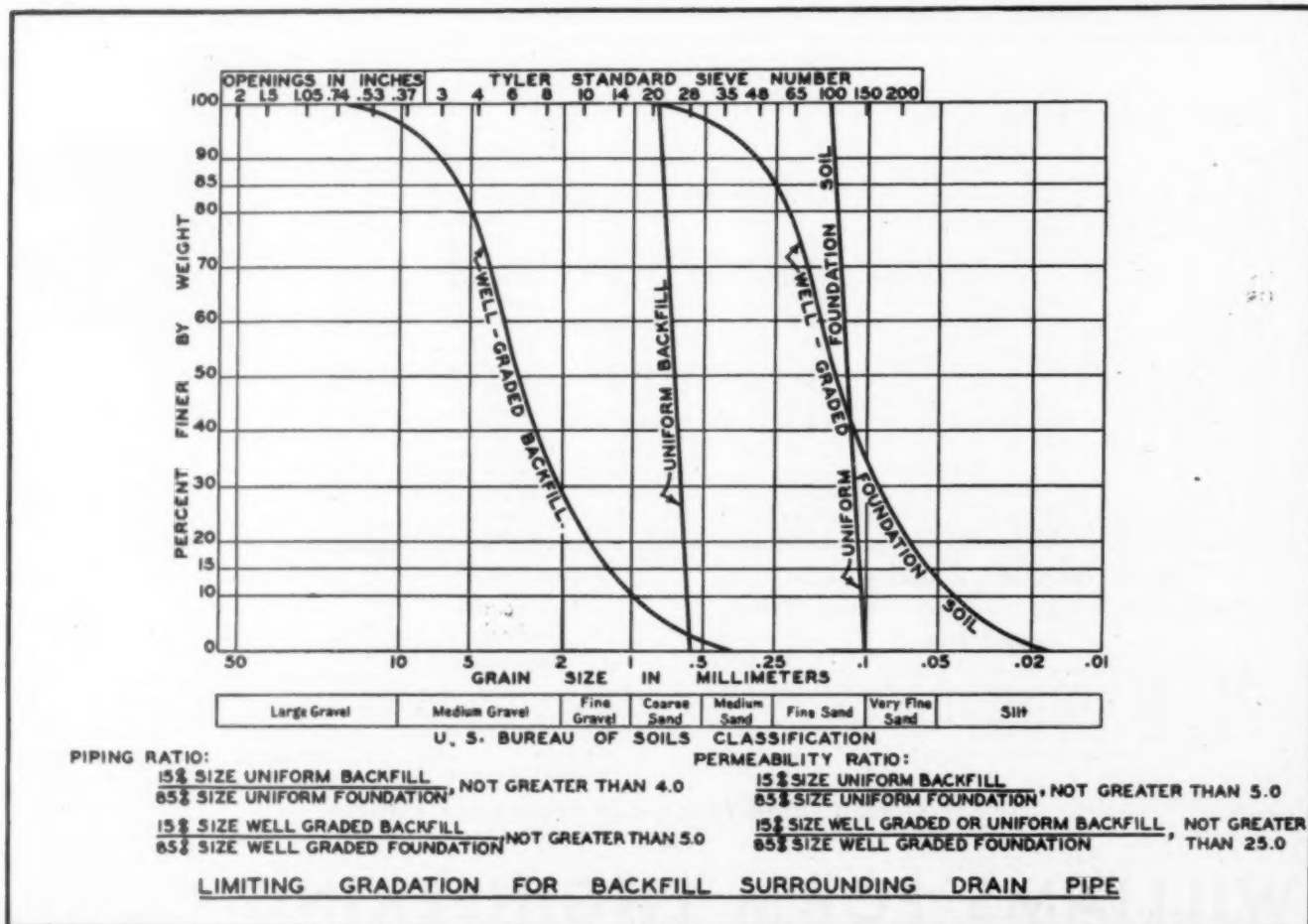


Fig. 5.—Limiting gradation for backfill surrounding drain pipe

AGAIN ENGINEERED TIMBER *Solves a Bridge Problem*



TECO Construction saves time and money ... releases urgently needed metals!

Timber construction of highway bridges, besides releasing urgently needed metals for war purposes, will produce sturdy structures speedily and at low cost.

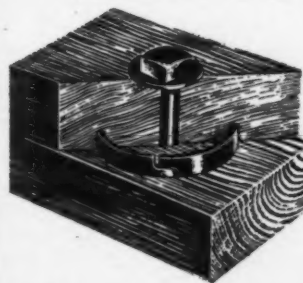
Most of the bolts, plates, and angles formerly used in heavy construction work are eliminated by the TECO Timber Construction System. Labor, hardware, and erection costs are reduced.

These factors were important to the designer of this bridge ... and he also advantageously used the technical data and typical TECO designs we gladly supply as a guide.

So consider timber ... and TECO construction ... on your next project. At your request, we'll send full information.



Alabama's new Crabbe Road Bridge, spanning North River near Tuscaloosa, is 333½ feet long, with a 24-foot roadway and cost only \$5.36 per square foot of roadway, including the concrete piers.



The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood ... brings full structural strength of lumber into play.

Timber ENGINEERING COMPANY

1337 CONNECTICUT AVENUE • WASHINGTON, D. C.

drainage and for subdrainage are, of course, applicable to the combined installation.

WAR DEPARTMENT
OFFICE OF
THE CHIEF OF ENGINEERS
WASHINGTON CE
Construction No. 206, 1941.
E. D. 600. 1 (Airfields)

December 18, 1941.

CIRCULAR LETTER

Subject: Airfield Construction—
Backfill for French Drains and
Filters Surrounding Subdrainage
Pipes.

To: Division and District Engineers

1. The occurrence of several failures of sub-drainage systems due to movement of material from the pipe trench walls into the pervious backfill, has resulted in pavement collapse along the edges, or complete clogging of the drain. This has emphasized the importance of carefully selecting the pervious backfill. The accompanying chart, showing the relationship between the grading of foundation soils and adjacent pervious backfill necessary to prevent movement of the fine soil fraction, is furnished for the guidance of Division and District Engineers in the design of French drains and filter layers surrounding drain pipe.

2. The limiting size and gradation for the backfill to be placed adjacent

to trench walls are shown for both uniform and well graded soil types. The limiting curves [figure 5] to be used are based on the ratio of the 15 per cent size of backfill to the 85 per cent size of the foundation material, which has been termed the piping ratio. As the criteria have been expressed as ratios, the curves may be applied to any range of grain size distribution as long as the relationship between the curves is maintained as shown.

3. For some drain pipes, where the openings are large, an additional layer of coarse material will be required adjacent to the pipe to prevent movement of the backfill or filter material into the pipe. Where the natural material is definitely cohesive, a greater difference between backfill and natural material can be allowed. The most unstable materials are cohesionless fine sands and coarse silts; therefore, special attention should be given to the selection of backfill materials where these types of soils are encountered. The backfill material should be compacted to form a uniformly dense mass in order that maximum stability will be obtained.

By direction of the Chief of Engineers:

(Signed) JOHN R. HARDIN,
Lieut. Col., Corps of Engineers,
Executive Assistant.

of applied load would not produce a "Flight Strip" runway predictably able to stand up under all conditions. To make provision for the various factors which must be considered, including the various weather conditions which will be encountered in the different areas where "Flight Strips" will be constructed, individual site study is clearly necessary, and soil, soil moisture, climate, temperature and drainage must be evaluated. It is clear also that recognition must concurrently be given to the part which maintenance must play in preserving the strength of "Flight Strips" runways during their years of service. Both rigid and flexible types of "Flight Strips" are designed upon the basis of existing subgrade conditions, and no information yet available indicates the need for any radical changes from conventional highway design, so long as the work is done by engineers who know the characteristics of the region with respect to soil, climate and materials.

Again let me thank you for affording me this opportunity to correct this unfortunate error, and for the generous interest which you and your magazine have taken in the "Flight Strips" program.

Very Sincerely yours,
STEDMAN SHUMWAY HANKS,
Lieut. Colonel, Air Corps.

Letter to the Editor Correction to "Flight Strips" Article, April Issue

Dear Mr. Brown:

Receipt is acknowledged of your letter in which you inquire whether the statement concerning the bearing characteristics of "Flight Strips" contained in the April issue of *ROADS AND STREETS*, p. 70, is an error.

My statement that "new heavy bombardment designs up to and including the Spring of 1944 will call for . . . static wheel loads of 60,000 pounds, tire inflation of 70 pounds . . . with a design stress requirement of 583 pounds per square inch . . ." was clearly erroneous. I regret that this mistake, which was committed in the preparation of my paper, was unnoticed by me, and that I therefore inadvertently relayed this misinformation to you.

When the ratio of horizontal to vertical speed of landing aircraft is considered — approximately 120-150 feet per second horizontal to 1-5 feet per second vertical—it becomes apparent upon plotting the horizontal and vertical vectors and determining

their resultant that applied loads normal to runway surfaces are such as to give to an impact factor allowance of 25 per cent a very considerable margin of safety. Using the data submitted in my article, a 60,000 pound load with 70 pounds tire inflation pressure would produce a gross contact area of 857 square inches. Using a correction factor of 0.9 to compensate for tire rigidity, the net contact area would be approximately 771 square inches. Sixty thousand pounds divided by 771 square inches equals 78 pounds per square inch uniformly distributed unit load. Employing the arbitrary factor for impact of plus 25 per cent increases this unit value to 97.5 pounds per square inch. For convenience 100 pounds per square inch may be used.

There will undoubtedly be difference of opinion as to the need for runways designed for stress requirements of 100 pounds per square inch. It is well recognized, however, that design based solely upon calculations

Navy Seeks Civil Engineers for Commission in Naval Reserve

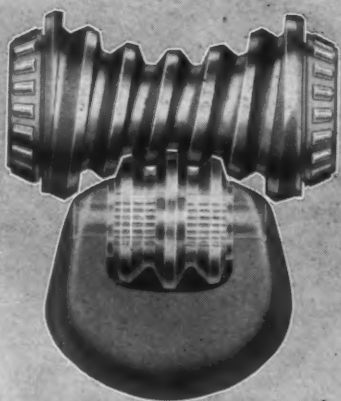
Requirements for appointment as Ensign in the Civil Engineer Corps Reserve of the Navy have been revised to attract more men to the United States Navy. Heretofore graduates with a scientific degree had to have a minimum of three years of active engineering practice subsequent to their graduation. Now men with limited practical experience who have graduated from accredited colleges and universities from the classes of 1941 and prior years and who have received degrees in Civil Engineering, Mechanical Engineering, Electrical Engineering, and Architectural Engineering, are being offered the opportunity of applying for a commission in the Naval Reserve.

It is estimated that between two hundred and three hundred additional Reserve officers will be needed to complete the war expansion program. All college graduates who believe themselves qualified are urged to make application to the Commandant of the Naval District in which he resides.



GEMMER STEERING GEARS

THE "Ceiling" IN DESIGN
AND QUALITY CONSTRUCTION



*The Symbol of
Steering Excellence*



THE GREAT military plane soars high into the blue—to the "ceiling"—the highest attainable.

Gemmer Steering Gear design and construction likewise soars above the field—reaches the "ceiling" in ease of steering, endurance, and power for all types of commercial, bus, military, industrial and agricultural vehicles.

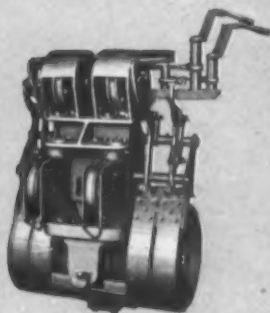
Gemmer Triple Roller Tooth Steering Gears have these all-important and desirable steering factors: **EFFICIENCY**—Highest available—provides easy steering always—plenty of power for parking. **STABILITY**—Steering is firm, response positive, with absence of rubbery feeling and wander. **SAFETY**—Abundant safety factor—low internal stresses. **DURABILITY**—Endurance for the life of the vehicle. **CONVENIENCE**—Compact design for easy installation and weight saving without sacrifice of steering arm angularity or overall capacity.

GEMMER MANUFACTURING COMPANY • 6400 Mt. Elliott Ave., Detroit, Mich.

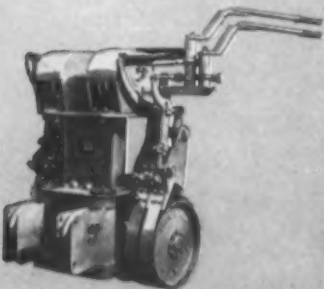
BUCKEYE



A Few of the Design Features of Buckeye Power Control Units



ABOVE — Model HD (Heavy Duty) Hoist. For larger model tractors.



ABOVE—Model MD (Medium Heavy Duty) Hoist. For smaller size tractors.

FIT ANY MAKE OR MODEL OF TRACTOR—Adaptors supplied for easy mounting—no cutting or drilling required.

CHOICE OF SINGLE OR DOUBLE DRUM—Single drum model operates bulldozer or single line equipment towed by tractor drawbar. Double drum operates double line scrapers, etc., or a combination of bulldozer and other single line equipment.

NO JERK ON LINE—Clutches and brakes take hold of load smoothly—no jerking impact, thus smaller, less expensive cable can be used, that is $\frac{3}{8}$ " to $\frac{1}{2}$ " in place of $\frac{5}{8}$ " and $\frac{9}{16}$ " often used.

SWINGING FAIRLEADS—Swing in excess of 180° —correct design minimizes cable wear.

LONG LIFE BRAKE AND CLUTCH BANDS—Interchangeable, easily removable, molded block type, guaranteed unconditionally for 500 hours.

EASY ADJUSTMENT—Only two simple adjustments required for fast action.

CORRECT GEAR RATIOS—For best line speed.

LOW CENTER OF LINE PULL—Keeps tractor in balance at all times.

Complete Power Control Unit specifications and data available on request. Write to Buckeye today.

20 USES OF BUCKEYE POWER CONTROL UNITS

Dirt Moving

1. PULLING DOUBLE OR SINGLE LINE SCRAPER.
2. OPERATING WITH TRAILBUILDER OR BULLDOZER UNITS
3. PULLING A THREE OR FIVE TOOTH RIPPER
4. OPERATING A PUSHER BEHIND SCRAPER
5. COMBINATIONS OF THE ABOVE
—or with Tripod Attachment

6. PILE DRIVER
7. POST PULLER
8. POST SETTING
9. CULVERT PLACING
10. LOADING AND UNLOADING HEAVY EQUIPMENT
11. REMOVING OLD CULVERT ABUTMENTS FROM RIGHT OF WAY
12. PAVEMENT BREAKER (with nut-cracker)

—or Hoist Only

13. CLEARING RIGHT OF WAY STUMPS, TIMBER, ETC.
14. STOCKPILING DEBRIS FROM RIGHT OF WAY
15. UPROOTING TREES
16. MISCELLANEOUS HOISTING
17. FREEING BOGGED DOWN WHEEL TYPE EQUIPMENT
18. HANDLING SKID-MOUNTED EQUIPMENT UNDER DIFFICULT CONDITIONS
19. OPERATING DOUBLE LINE CABLE-WAY DRAG SCRAPER
20. PULLING CABLES THROUGH CONDUITS

Cable Control-

WILL KEEP PACE WITH YOUR TRACTORS!

IN earth moving, your tractors are only as fast as the tractor equipment you use with them. Sluggish dozer or scraper action puts a heavy penalty on your machines, limits their speed and robs you of the output they're built to deliver.

Not so with Buckeye Cable Control. Buckeye Power Control Units are *fast*—they'll keep pace with your tractors. A touch of the control lever and the line sings into action instantaneously. You can coordinate all functions of the tractor and equipment, with the tractor operating at full

speed. You get all the power you need on the line to handle the heaviest going and when the day is done, you'll find you've chalked up more yardage per horsepower hour.

Buckeye Power Control Units are built in Heavy Duty and Medium Duty Models for every make and model of tractor. Plan now to have fast Cable Control — at its best with Buckeye Power Control Units. Complete data supplied on request. Write to Buckeye today.

BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio



BUCKEYE UNITILT DOZERS

Cable Control! Bulldozer and Trailbuilder Moldboard interchangeable on the same frame! Blade digs its own way in and *rolls* the dirt ahead! Blade hugs radiator, reduces overhanging load, keeps tractor in balance! Both blades tilt—adjustable by one nut! High blade lift! Simple—rugged—rigid! For all makes and models of tractors! Write for details!

Built by **Buckeye** ✓

Convertible Shovels



Trenchers



Tractor Equipment



R-B Finnedozers

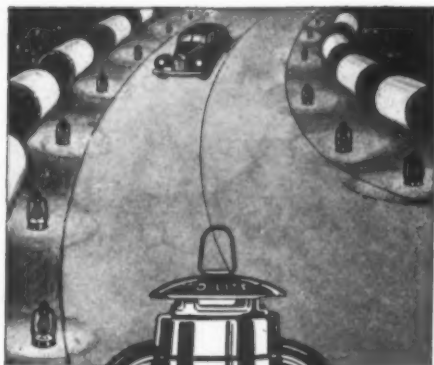


Road Wideners



Scrapers





RED for Light and SAFETY



RED globe DIETZ Lanterns mean "DANGER—STOP." No other signals or devices so instantly and obviously evoke caution, guide to safety, and prevent needless accidents.

For safety's sake, keep available a good supply of DIETZ LANTERNS with wicks trimmed, and founts filled with inexpensive kerosene... ready for service the moment sudden emergencies arise.

Dietz Lanterns burn long hours at a time without diminishment under the most severe conditions.

Note: For diminishment of light during blackouts, Clear or Red Globe DIETZ LANTERNS are recommended when regulated down to low intensity.



R.E. DIETZ COMPANY
1840 NEW YORK 1942

Output Distributed Through the
Jobbing Trade Exclusively.

Savings Will Assure Victory

By HENRY MORGENTHAU, JR.

Secretary of the Treasury of the United States

UPWARDS of 50 per cent of our total productive capacity and an equal share of our national income must be diverted to making war materials.

If the Government is compelled to go to the commercial banks for the bulk of these funds, the result will be to increase inflationary tendencies which are already serious. This is true because when commercial banks buy Government Bonds they do not pay for them with actual cash taken from their vaults, but by placing on their books newly created deposits to the credit of the Government. When the Government draws upon these deposits to pay for the goods and services it buys, the purchasing power of those to whom these payments are made is increased without any decrease in the purchasing power of those from whom the money is borrowed.

When bonds are purchased with savings out of current income, on the other hand, such savings help to reduce excess consumer income which if spent for a limited supply of consumer goods would tend to force prices up. It is for this reason, among others, that we are going directly to the people for as much as possible of the money needed for the war.

Pay Roll Saving Plan

The most effective, single method for promoting the systematic purchase of United States Savings Bonds is through the payroll savings plan. Already nearly 50,000 firms in the United States employing a total of almost 20,000,000 people have made such plans available to their employees.

Time Is Short.—The ever-increasing demands of our war machine create an urgency that we cannot escape or evade. To raise the billions which we now need to win the war, and to do all in our power to check inflation, we must raise our sights. I am suggesting, therefore, as a total or quota for those administering the payroll savings plan, that AT LEAST 10 per cent of gross payroll be set aside by the employees for the purchase of United States Savings Bonds.

We are still a long way from that goal. Among the nearly 50,000 firms having a payroll savings plan the average participation at the present time is about 45 per cent of the employees. The average monthly saving is about \$7.50 per capita, representing in the neighborhood of 4.8 per cent

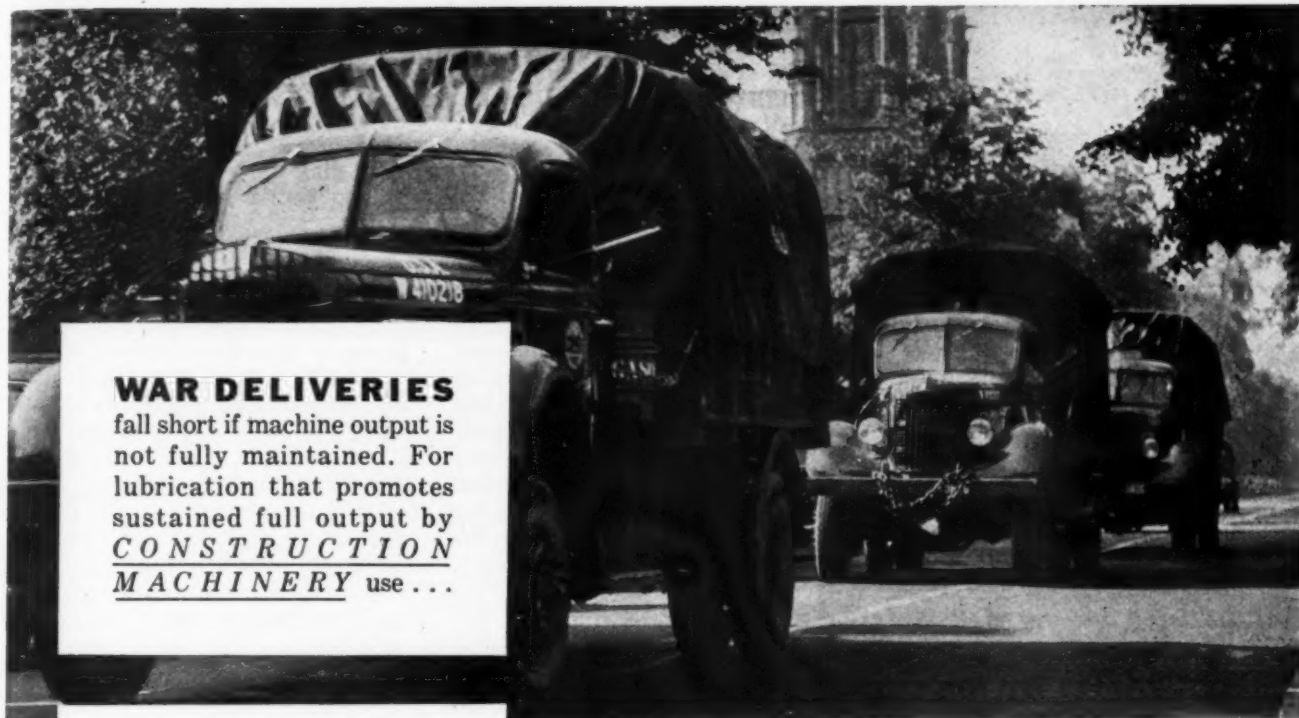
of the pay of those participating. In other words, if we consider ALL of the employees of all the participating firms, only a bit more than 2 per cent of the gross payroll is now being invested in Defense Bonds.

Considering the difficulties involved in the initial installation of payroll savings plans this is a good record. But we must go forward now on two fronts: **FIRST**, we must increase the percentage of employees participating in payroll savings plans from approximately 40 per cent to at least 90 per cent of the total number. **SECOND**, we must encourage all participating employees to increase their average monthly allotment from about \$7.50 per capita to an average of nearly \$20 per capita.

A flat 10 per cent allotment of individual wages and salaries by all employees will not accomplish this purpose. It does not take account of individual differences either as to income received or personal and family responsibilities. Some individuals will be able to set aside a good deal more than 10 per cent of their pay; others less. The overall result, however, should equal 10 per cent of the gross payroll. The formula according to which the savings quota is distributed among the employees will vary from place to place.

Voluntary Participation Most Desirable

In conducting a drive for increased participation at higher rates of saving, the friendly active co-operation of the workers themselves is of the utmost importance. Organized Labor—including the American Federation of Labor, the Congress of Industrial Organizations, the Railroad Brotherhoods and their constituent unions almost without exception—has pledged its full all-out support of this program. Employers must remember that it is the money of their employees which is being invested in Savings Bonds through payroll savings plans and must encourage in every way possible—by joint committees or other methods of co-operation—a spirit of partnership and joint loyalty among all the good American citizens participating. Working together, management and labor can not only insure the success of this most important war effort, but can lay the foundations for improved industrial relations which will bear increasingly rich fruit in the years to come.



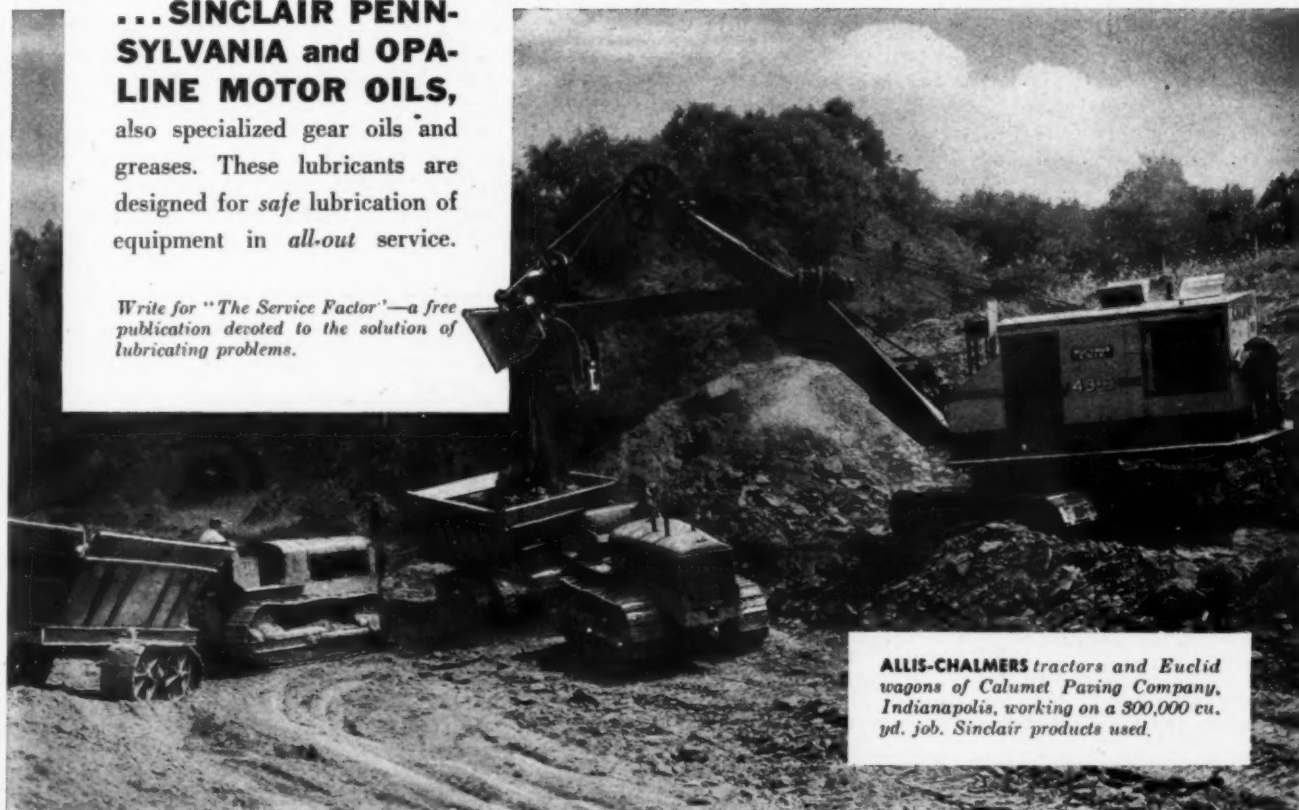
WAR DELIVERIES

fall short if machine output is not fully maintained. For lubrication that promotes sustained full output by **CONSTRUCTION MACHINERY** use...

...SINCLAIR PENNSYLVANIA and OPA-LINE MOTOR OILS,

also specialized gear oils and greases. These lubricants are designed for *safe* lubrication of equipment in *all-out* service.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



ALLIS-CHALMERS tractors and Euclid wagons of Calumet Paving Company, Indianapolis, working on a 300,000 cu. yd. job. Sinclair products used.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 WEST CERMAK ROAD
CHICAGO

10 WEST 51ST STREET
NEW YORK CITY

RIALTO BLDG.
KANSAS CITY

573 WEST PEACHTREE STREET
ATLANTA

FAIR BUILDING
FT. WORTH

ROADS AND STREETS, May, 1942

Traffic Segregation Design

"Keeps Them Rolling"

WHEN the state highway engineers of California designed the East Shore Highway a few years ago as a limited access, high-speed route between northern points and the San Francisco-Oakland Bay Bridge, they reckoned without the great, sprawling shipyards that would mushroom in Richmond overnight and the booming defense industries of adjacent Berkeley and Emeryville whose payrolls would double, quadruple and then double again. Their traffic studies indicated a steady future growth for the area, and they planned for it with a divided highway having two 21-foot lanes and 12-foot oiled shoulders.

But by early 1942 the situation had become acute. Many of the shipyard and defense factory workers lived in San Francisco and drove to work; many more lived in Oakland and used the East Shore Highway as the fast-

est artery. Heavy trucks plied the route in daily increasing numbers. At peak hours, East Shore Highway was lined with vehicles bumper to bumper as far as one could see and hours were lost getting tired workers home and fresh workers to the job to turn out the implements of war. Moreover, the accident incidence multiplied.

The Problem

Studies of the problem revealed four bottlenecks, all at points of access along the highway. One occurred at Powell Street, a feeder to the Emeryville industrial district which carried heavy truck traffic. Ashby Avenue, a few blocks north from this point, was the next heavily-used connection, leading both to industrial and residential areas in Emeryville and Berkeley. Then at University Avenue a great flow of traffic going to downtown Berkeley sought ingress and

egress to East Shore Highway, while the fourth danger point was at the intersection with Panhandle Boulevard. The latter street carried heavy traffic, being a connection between San Pablo Avenue (another major arterial lying parallel to and east of East Shore Highway) and the Richmond war industry area.

The normal solution, provided funds had been available, would have been to construct grade separation structures at all four points. But shortages in materials due to the war and the pressing demand for immediate opening of the bottlenecks led to an unique traffic segregation design involving acceleration and deceleration strips, directional islands and traffic-actuated signals which promised to alleviate the condition speedily and economically. Contract for the work, awarded on Jan. 6 to Lee Immel, Berkeley contractor, was

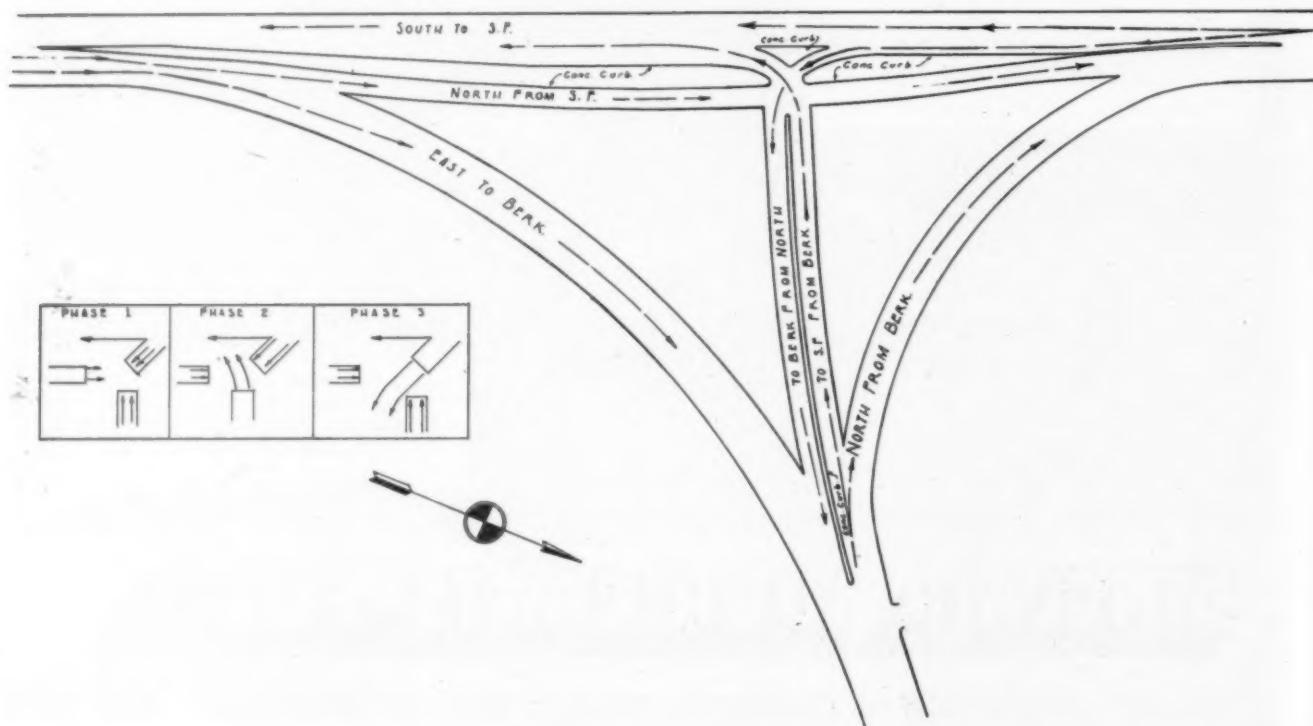


Fig. 1.—Drawing of traffic segregation at Ashby Avenue showing acceleration and deceleration lanes, channelization, and operation of 3-way light signals



HEAT

THAT ASPHALT OR ROAD
OIL WITHOUT DELAY!

ROADS — well maintained — are of prime importance in wartime . . . for fast, unhampered transportation and communication between military and industrial centers. Good roads contribute to conservation of tire rubber, too — add many more rolling miles to the tires of all classes of motor vehicles.

Highway authorities recognize the vital necessity of road maintenance as essential to the war effort. And Cleaver Bituminous Boosters and Tank Car Heaters are more important than ever

today . . . providing fast, efficient heating of bituminous material in tank cars and storage tanks at lowest cost. Road crews are not delayed when Cleaver equipment is on the job — heating and pumping oil is no tedious, time-consuming job. Bituminous boosters and tank car heaters were pioneered by Cleaver — hundreds of them are in nation-wide use. Their practical, exclusive design was perfected by Cleaver engineers. They are without equal in performance.

Write for complete information.

CLEAVER-BROOKS COMPANY

5106 North 33rd Street
MILWAUKEE, WISCONSIN

Pioneer Builders of Heating
Equipment for Bituminous
Materials in Tank Cars and
Storage Tanks . . . Cleaver
Heaters and Boosters . . .
Cleaver Automatic Steam Plants.

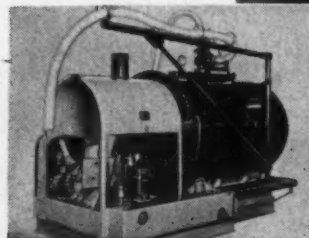
Cleaver Portable Pumping
Booster mounted on truck in
service of Oklahoma Bitumi-
nous Distributing Co., Ada,
Oklahoma. This unit is op-
erated in airport and military
road construction.



Cleaver

BITUMINOUS BOOSTERS
TANK CAR HEATERS

Cleaver Portable Tank
Car Heater — a high
pressure, oil-fired, com-
pact, mobile heater avail-
able in two and three
tank car sizes. Famous
Cleaver design boiler with
four-pass flue travel as-
sures most economical
operating costs.



Typical Cleaver Portable
Pumping Booster — with-
draws pumpable bitu-
minous material from
car — heating by direct
firing to application tem-
perature in one opera-
tion. Raises car temper-
ature 50 degrees per hour.
Available in three sizes
— on truck mounting or
4-wheel trailer.

only at \$162,512.30, and it covered the construction at all four points with a total length of 1.26 miles. It was specified that the project be completed July 1.

The design at Ashby Avenue contains most of the elements found at the three other locations. This intersection was previously the most hazardous: Ashby Avenue terminated in a Y-connection at East Shore Highway and each branch of the Y carried two-way traffic. Vehicles proceeding from Berkeley toward San Francisco had to cross through opposing northbound traffic on a long line which offered many possible points of collision, and then slowly enter the high-speed southbound traffic stream. In a similar manner, traffic left-turning from East Shore Highway toward Berkeley had to cross over the northbound high-speed lanes.

The Solution

Solution was found in providing acceleration and deceleration lanes and in adding a central stem to intersect the East Shore Highway at right angles, as shown on the accompanying drawing, figure 1. Traffic from Berkeley, northbound, takes the right branch of the Y and enters the main traffic stream from an acceleration strip. Traffic from San Francisco, turning off toward Berkeley, drops onto a deceleration strip, and thence passes to the other branch of the Y. All southbound traffic proceeds without interruption; northbound traffic is stopped as needed by the traffic-actuated signals.

Vehicles from Berkeley to San Francisco proceed straight to the East Shore Highway, then obey the sig-

nal. When allowed to proceed, they are directed to the acceleration strip by a directional island. Southbound vehicles left-turning toward Berkeley drop onto a deceleration strip, then are controlled by a signal before proceeding. Procedure of traffic under the three phases of the traffic-actuated signal system is indicated in the box within the drawing, figure 1.

The channelization at Powell Street is handled in a somewhat similar manner, although it is in the form of a straight T-connection. Northbound traffic turning right drops onto a deceleration strip, while Powell Street traffic right-turning onto East Shore Highway is provided with an acceleration strip. Southbound through traffic is squeezed over by an island onto a new strip of pavement at a point about 350 feet ahead of the intersection, while southbound traffic wishing to left-turn onto Powell is allowed to drop back on the pavement adjacent to the centerline divider after passing the end of the island. This particular design is worthy of special mention due to its unusual conception. The island begins at a point about 650 feet back from the intersection and has a total length of about 450 feet. It reaches its widest point 350 feet from the intersection, then dies back into the centerline divider 200 feet from the intersection. This has the effect of making a 200-foot deceleration from the end of the island to the intersection and adjacent to the centerline. Traffic from Emeryville left-turning onto East Shore Highway is given the benefit of this deceleration lane.

The problem at University Avenue

was practically identical in principle with that at Powell Street, and was solved in a like manner. The one noteworthy deviation was in a road turning off East Shore Highway to the Berkeley pier, at a point slightly south of the main intersection. Acceleration and deceleration strips and the installation of a four-phase signal system provided the answer in this case.

Panhandle Boulevard enters East Shore Highway at an acute angle, hence this crossing was abnormally long. Here the treatment was more or less conventional, with installation of acceleration and deceleration lanes and traffic directional islands on Panhandle Boulevard at its junctures with East Shore Highway. Traffic-actuated lights completed the installation.

Construction

At Powell Street.—Both asphaltic concrete and Portland cement concrete are used in the construction. At Powell Street, the new work consists of a six-inch crusher run base, six inches of imported borrow and four inches of asphaltic concrete topping. The latter was constructed over the old pavement to bring it up to grade. The existing timber curb was adjusted to grade without replacement. Here, a 12- and a 13-foot lane were added on the west side, and the acceleration and deceleration strips on the east side are 13 feet wide.

At Ashby Avenue.—None of the existing pavement is utilized at Ashby Avenue, where portland cement concrete is employed in a pavement of 9-7-9-inch section for each lane. This pavement is laid over the old asphaltic concrete, with a sand cushion course of about two-inch thickness provided. The old armor-coat shoulders were removed and wherever necessary the work was brought up to grade with imported borrow. The east side is of like construction. Maximum width on the west side is 58 feet; on the east lane, 23 feet.

At University Avenue.—Pavement design at University Avenue is similar to that at Ashby, although here the west lane has a 51-foot width and the east lane, 45 feet.

At Panhandle Avenue.—At the Panhandle Boulevard location, new asphaltic concrete, portland cement concrete and the existing plant-mix surfacing were all combined to form the roadway. Pavement width is a maximum of 44 feet on the west side and on the east lane, 34 feet wide.

Versatile Crane.—Construction was complicated considerably by the traf-



Fig. 2.—Removing old armor-coat shoulder after it had been scarified



Maintain Ten Times the Mileage with Each Blade, Tire and Truck on CALCIUM CHLORIDE Consolidated Roads

IT IS well known that road surfaces, consolidated with calcium chloride, require only a fraction of the maintenance needed on loose unbound surfaces. Maintenance figures from many leading counties and states definitely show that one maintenance blader can serve ten times as many miles if roads are consolidated with calcium chloride. This is doubly important now that cutting edges are so scarce.

Reliable statistics show, also, that surface consolidation saves up to 300 cubic yards of aggregate, annually wasted on unbound roads. This means not only a financial saving

in aggregate replacement, but a further substantial saving of tools and shovels, as well as trucks, tires and manpower.

To make good secondary roads out of poor ones and to improve roads steadily with meager maintenance budgets, consolidate all unpaved surfaces.

New literature tells how and when to add coarse or fine aggregate, or binder soils, so that when moisture bound with calcium chloride your roads last longer and serve better with much less wear on maintenance equipment and funds. Write for new literature today.

CALCIUM CHLORIDE ASSOCIATION, 4145 Penobscot Bldg., Detroit, Michigan



CALCIUM CHLORIDE
for SURFACE CONSOLIDATION

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Bldg., Detroit, Mich.
Please send me new Road Surface Consolidation Book.

Name _____
Address _____
City _____ State _____



Fig. 3.—Sprinkling sub-grade at Ashby Avenue intersection prior to pouring. This section was built up to grade with red shale from a borrow pit. Truck in background used to pull sub-grade template

fic problem; otherwise it proceeded in normal fashion. A $\frac{3}{4}$ -yard crane with clamshell equipped with preformed wire rope was used to remove the old armor-coat on the shoulders and to handle miscellaneous excavation. One interesting use to which this machine was put was in pulling the old electroliner bases, which were concrete blocks embedded several feet in the ground. After the electroliners had been removed, a steel jog bored to fit the protruding studs was bolted to the block, then hooked onto the crane load-line. The crane yanked them out like gigantic teeth—a minor phase of the job but one of those time-savers which in the aggregate saved money for the contractor.

Where the crane is put to such varied work as on this job, the contractor has found that preformed wire rope is advisable. The bucket used on the crawler crane was of the multiple reeve type, the short sections of the closing lines operating over relatively small diameter sheaves. Hence, the wire rope had to undergo a great deal of bending action. Preformed wire rope, with each strand and wire "at rest" due to the preforming process of manufacture, resists metallic fatigue coming from bending and lasts much longer. This in turn is translated into saved time that would have been wasted in reeving of new lines more frequently, and in materials conserved for the war effort.

After rough excavation with the clamshell, the roadbed was shaped with an Allis-Chalmers HD7 tractor and a motor grader, and the imported borrow was placed. This material, a red shale characteristic of the vic-

nity, was procured at a borrow pit in Ele Cerrito about three miles distant and brought to the job in $4\frac{1}{2}$ -yard trucks, where it was spread by the motorgrader and compacted with a ten-ton roller. Then forms were stretched, the contractor using both steel and wood—the latter because it was not possible to secure enough steel forms for the job when needed. A subgrader traveling on the forms was used to level the subgrade. Previous to pouring concrete, the subgrade was sprinkled with an 1150-gallon water wagon.

Concrete aggregates were batched in a commercial plant in Berkeley and paving was done with a one-yard Foote machine. An Ord tamper and a finishing machine were used to complete the surface, following which the concrete was cured for 72 hours under cotton mats. Asphaltic concrete was taken from a local commercial plant and placed with a bituminous spreader.

Personnel

Staff at the job for the state included Henry Simard, Resident Engineer; and Gilbert Levier, Assistant Resident. Robert Norris was Contractor's Superintendent, while Lee Immel personally supervised much of the work.

Track-Laying Tractors Frozen

On Feb. 19, 1942, the War Production Board issued an order, Limitation Order 53 (L-53), prohibiting the sale or delivery of unused track-laying

tractors and certain auxiliary equipment in the possession of manufacturers, distributors and dealers. Equipment covered by the order included bulldozers, angledozers, power control units, and winches to be mounted on unused track-laying tractors. An exception was made in the case of persons whose orders have been assigned a preference rating higher than A-2.

The order was made to insure the military and essential demands for track-laying tractors and equipment to be mounted on them. The constantly increasing requirements for this type of equipment by the armed forces and Lend-Lease alone indicate a demand that will possibly exceed the 1942 productive capacity of the industries.

The order was issued to provide time for complete inventory of the number of track-laying tractors in possession of manufacturers, distributors and dealers; to provide time for completing the mechanics of controlling distribution and to preclude the interim delivery of tractors to other than essential uses.

This order was prepared by men, your friends, thoroughly acquainted with the construction field from both the manufacturer's and the user's viewpoints. It can be taken for granted that it was issued in the best interests of the War effort. There is nothing in the order preventing anyone from making a sale, lease, trade, loan, delivery, shipment, or transfer of auxiliary equipment to be mounted on a track-laying tractor now in the possession of an ultimate consumer.

Since this order was issued a supplementary limitation order, L-53a, has been posted which prohibits production of smaller tracklaying types—those in the 17 to 35 horsepower class—after September 1, 1942. The purpose of this order is to provide more shop capacity for the production of the large models. These smaller sizes which are to be produced under the program until Sept. 1, will be distributed by the WPB in accordance with provisions of L-53, which prohibits distributors from making deliveries except upon specific authorization of the Director of Industry Operations. Wheel type tractors are, of course, not affected by this order. Under the program adopted the following can be made:

Producer	No.	Size
Allis-Chalmers Mfg. Co.	1000	M
Caterpillar Tractor Co.	1000	D-2 or R-2
International Harvester Co.	600	TD-6 or T-6
Cleveland Tractor Co.	435	A or H

Huge Investment in Pennsylvania Turnpike

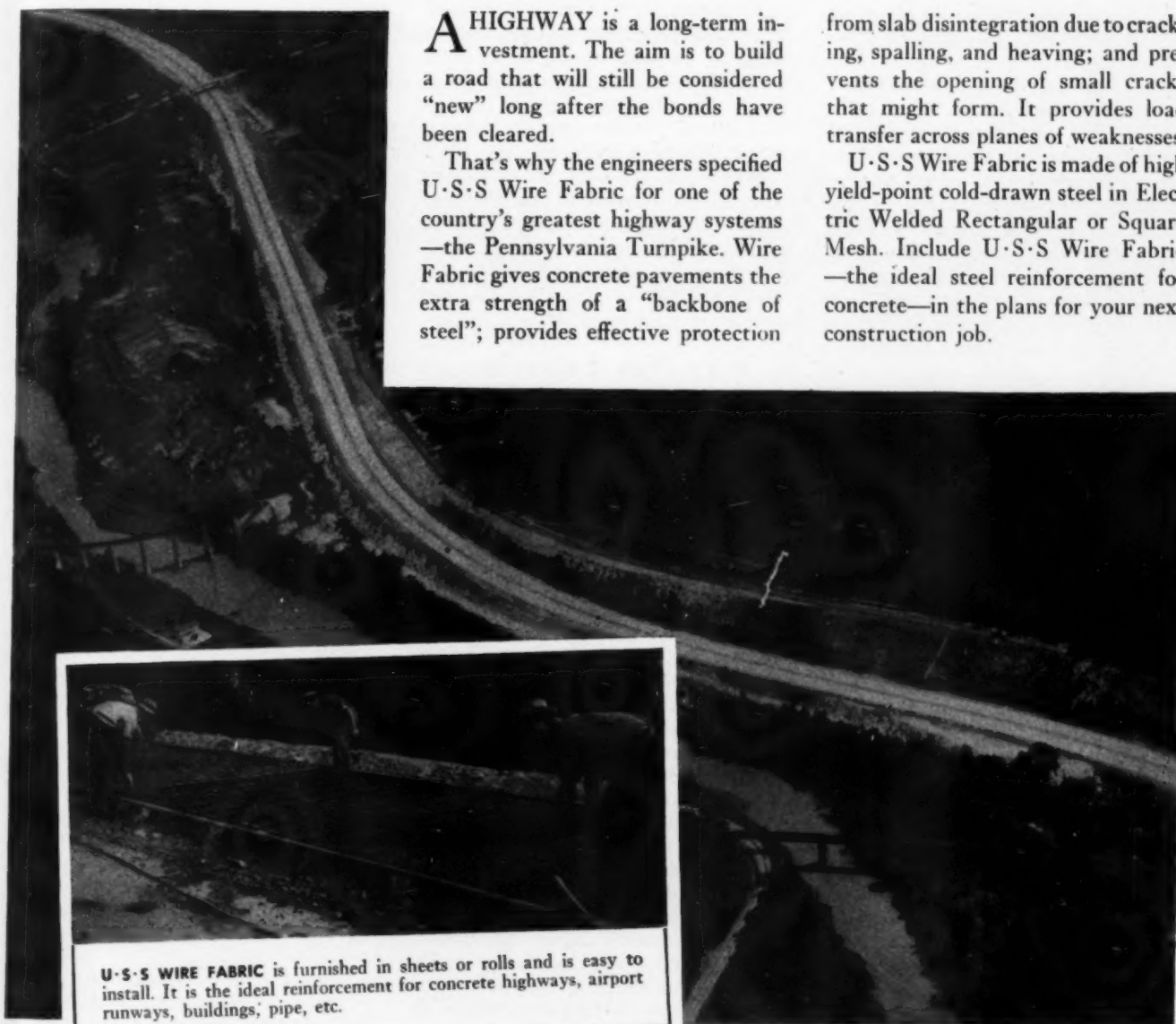
protected with U.S.S. Wire Fabric

A HIGHWAY is a long-term investment. The aim is to build a road that will still be considered "new" long after the bonds have been cleared.

That's why the engineers specified U.S.S. Wire Fabric for one of the country's greatest highway systems—the Pennsylvania Turnpike. Wire Fabric gives concrete pavements the extra strength of a "backbone of steel"; provides effective protection

from slab disintegration due to cracking, spalling, and heaving; and prevents the opening of small cracks that might form. It provides load transfer across planes of weaknesses.

U.S.S. Wire Fabric is made of high yield-point cold-drawn steel in Electric Welded Rectangular or Square Mesh. Include U.S.S. Wire Fabric—the ideal steel reinforcement for concrete—in the plans for your next construction job.



U.S.S. WIRE FABRIC is furnished in sheets or rolls and is easy to install. It is the ideal reinforcement for concrete highways, airport runways, buildings, pipe, etc.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York



UNITED
STATES
STEEL



ROADS AND STREETS, May, 1942

More "Straw Votes" for Victory*

IN my article of March 11 (See *April Roads and Streets*) it was pointed out that "the Flying Tigers" or American Volunteer Group in the Chinese service in Burma, had downed 111 Japanese planes up to Jan. 30 and that the last 50 of these had been destroyed at a cost of only two of the American Tomahawks. I called this a significant "straw vote" for victory, and particularly so because the American planes were stated to be superior in every way to Japanese planes. On March 21 the record set by these "Tigers" was 200 Jap planes with a loss of only 11 of their own, or 18 to 1. The Japs are reported to have had only 3000 good combat planes at the beginning of the war, and a productive capacity of only 250 a month. America is at present producing thousands of combat planes and is scheduled to produce 60,000 in 1942 and 120,000 in 1943.

Washington announced a few days ago that our Army had downed 245 Jap planes with a loss of only 48 of ours, or 5 to 1. The Navy had downed 246 Jap planes, but the Navy's loss was not stated, probably because it seemed unwise to give the loss at Pearl Harbor. However, that could not have been very serious for President Roosevelt said that our Army and Navy forces have destroyed more Jap planes than we have lost, in spite of the treacherous attack on Pearl Harbor.

If we take the combined victories of American Army and Flying Tiger planes versus Jap planes, the record stands at 445 Jap planes to 56 American planes destroyed, or 8 to 1. This is a "straw vote" that is beginning to get out of the "straw" into the whole-sale stage.

On March 19 there was cast the first "straw vote" of American and Australian bombing planes versus Japanese warships and planes. The score was 11 Japanese vessels sunk, 12 damaged and 3 planes destroyed. Our loss was one plane!

On March 23 Australian and American planes destroyed 20 Jap planes with a loss of only 2 of their own.

As stated in my last article, American heavy bombers are the most sensational product of this war. They have four motors that develop 4800 horsepower and are capable of flying 3,000 miles at 300 miles per hour, carrying up to 8,000 pounds of bombs. Equipped with a turbosupercharger,

one of these planes can scrape the stratosphere at 40,000 feet elevation, or two miles higher than the highest mountain in the world. Equipped with the secret bomb sight, they are the most accurately devastating bombers in existence. Starting with a combined capacity of only 40 of these huge bombers a year ago, seven of our great plane factories are rapidly moving forward to a huge monthly output, which will be reached by July, 1943.

When you consider that German and Italian bombers of less size and range have made the Mediterranean almost impassable for British merchant marine and troop ships, even under the best of protective convoys, you get a glimpse of what will hap-

pen to Japanese shipping before long.

As for Japanese warships, the bigger they are the harder they will fall, judging by what has already happened in all the theaters of naval warfare.

More than a month ago two German battleships made a dash from a French port to home waters, barely escaping destruction by British bombers and torpedo planes. This was followed March 9 by a dash of the Tirpitz, Germany's greatest battleship, toward a Norwegian port. A sort of battleship "hide and go seek"? Not at all, just hide and go hide.

Hasn't the term "dreadnought" as applied to a battleship become somewhat ridiculous?

Why Not Experiment with Bonus Payments, Mr. President?

By HALBERT P. GILLETTE

IN a press conference on April 7th President Roosevelt expressed his "unalterable opposition to the piecework system during peacetime and even more so in wartime." He said that he was convinced that the workers are determined to do their best and "do not need incentives in the form of bonuses or other rewards."

As for reliance solely on patriotism as an incentive to work hard, Vauban, the celebrated French military engineer and author of "Attack and Defense of Places," said that he had found that by paying his sappers "on the spot at piece-work rates" they excavated earth much faster. Encyclopedia Britannica assigns to Vauban "chief place among modern military engineers. His experience alone puts him in a category apart from others."

Note particularly that sappers work at the front where, if ever, patriotism should be an adequate incentive to work hard; yet Vauban found it inadequate.

In the April issue of "Reader's Digest," William Hard cites the increased output and increased pay of employees of the Waltham Watch Company that have followed since the company and the union recently agreed upon a policy of "individual rewards for individual productive ability." There is nothing new in such results. Engineering magazines and books have abounded in similar examples for more than 30 years. Then why has payment in proportion to individual performance made so little progress? The main reason appears to be the opposition of labor-union leaders. They apparently fear that

unless they can claim all the credit for pay increases, they may lose prestige. If workers can earn their own pay increases, union leaders may tend to become less important factors. That is their fear, although I think it is unfounded.

The President may have listened too much to arguments (there are few facts) discrediting piecework and bonus payments. Apparently he has not familiarized himself with even a very small part of the great mass of experience showing the merits of systems of payments that reward individual performance.

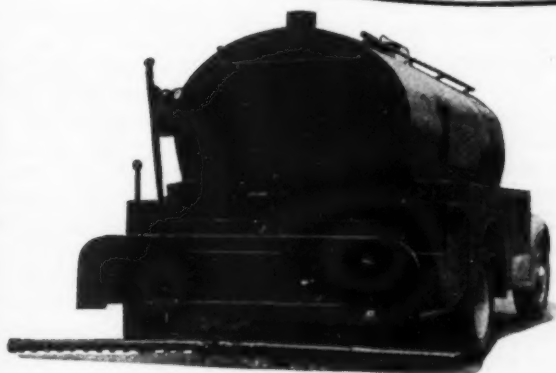
Fortunately he need take no former experiences and no man's arguments, pro or con, as to what should be done in the present crisis. Let him simply direct that a few factories engaged in different sorts of defense work be made the "guinea pigs." In those test factories let bonus payment systems be installed. Let the effects on the health of the workers be studied by physicians, and let the effects on unit-costs of the products be studied by engineers. As to the results, I have not the slightest doubt. Both output and wages will be increased to a surprising extent, without any decrease in the health of the workers, but with marked increase in their income.

The President has always favored political economic experimentation. He should favor this suggested experiment, not merely because of the ease and speed with which it can be made, but because of what is at stake. Let it result in a twenty-five percent increase in factory output and the period before victory will be shortened by at least that percentage.

* Reprinted from the April 9 Los Angeles Times.

LITTLEFORD EQUIPMENT KEEPS THEM ROLLING

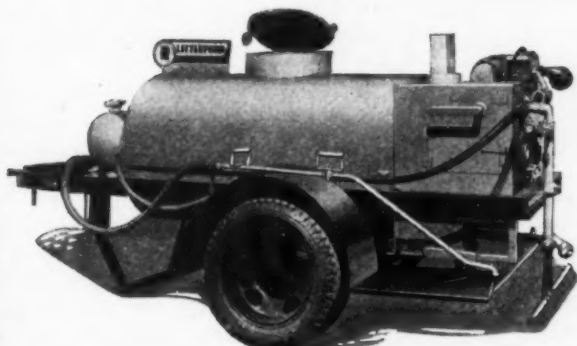
WITH MODERN BLACK TOP ROAD
CONSTRUCTION EQUIPMENT



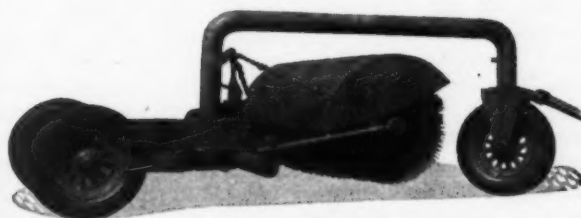
"Spray Master" Pressure Distributor



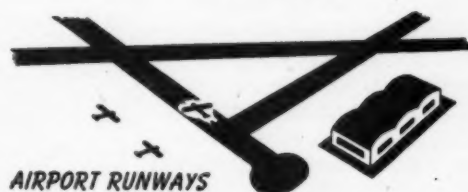
No. 84-HD Kettle



No. 101 Utility Spray Tank



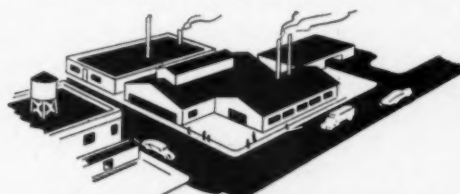
No. 106 Road Broom



AIRPORT RUNWAYS



STRATEGIC ROADS, HIGHWAYS AND STREETS



ORDNANCE AND DEFENSE PLANTS



CANTONMENTS

A Unit for Every Job

If it's for the construction or maintenance of Airport Runways, Strategic Roads, Highways and Streets, Ordnance Plant or Cantonment Streets and Parking Areas, Littleford Black Top Equipment will handle the job in less time and cost.

This modern Designed Equipment is efficient in operation accurate in application and sturdy in construction. "Keep them Rolling" —use Littleford Black Top Construction Equipment for better roads.



LITTLEFORD

LITTLEFORD BROS., INC.
454 E. Pearl St., Cincinnati, Ohio

ROADS AND STREETS, May, 1942

EDITORIAL

Drive On!

ADVERTISING at this time should be so prepared as to contribute effective information useful in the War effort. Many manufacturers, as may well be noted by studying our advertising pages, are using their advertising copy for this purpose. Advertising can contribute to our country's huge task of winning the war, in many ways.

One of the major jobs of advertising, at this time, and a job that is being shouldered more and more by advertisers, is that of providing information to those fighting on the home front and in the construction armies — information which helps them to increase the output of work per man or machine hour.

Similar types of equipment seldom have the same troubles in operation or seldom require attention at the same places. Each manufacturer needs to tell his customers and users how best to conserve the equipment they are now using. Editors can carry information of this kind in a general way, but general information is not good enough. Manufacturers would do well to suggest plant arrangement or equipment coordination plans in their advertising. They should tell users how best to operate particular makes of equipment.

In general, during 1942, production volume of the principal types of construction equipment is going to fall far short of military, Lend-Lease, and civilian requirements. Manufacturers outputs are going to have to be allocated. Civilian requirements on even some essential military installations will have to be postponed. Instead of building the intraplant or intracamp roads needed to expedite traffic and to eliminate delays caused by weather conditions, these projects may have to be postponed in favor of some more essential military requirement.

Contractors, states, counties, cities, and some of the federal agencies must keep their present equipment in the best shape possible until new units can be made available. Therefore, they must conserve, repair, and rebuild their equipment to handle the most pressing conditions which will confront them. Advertisers should shoulder a large part of the task of informing these agencies on how to "keep 'em rolling." Manufacturers, through their advertising, should present news of better ways of using their machinery, of time-saving

methods that can be widely adopted, of labor-saving made possible by new attachments or new operating methods.

The type of copy is that which will require quite large space — large enough to tell the whole story.

There is a big job for advertising to do in keeping the minds, the hearts and the courage of the production and construction armies fired with the enthusiasm. With such help from manufacturers, coupled with the high caliber administration of the war effort and the driving energy of a free people, our armed forces can be assured of victory. We dare not let them down. Advertising has been the great stimulator of the driving force in our past economy, *now is no time* to curtail that stimulant.

Some Absurdities of War-Work Planning

GOVERNMENT officials in charge of the synthetic rubber program apparently regard tires for motorists as they do cuffs on pants. Yet, as *Collier's Weekly* recently said: "Our whole economy is geared to our 33,000,000 cars, and any talk about any appreciable percentage of these cars being luxuries is dangerous nonsense. If many of these cars should be forced for long out of circulation, our whole economy would suffer a body blow."

Based on this sound premise, *Collier's* urges stepping up the schedule for synthetic rubber production to about 50,000 tons a month by mid-1943. This would provide for a normal consumption of raw rubber. But since war requirements are large, it would seem that 50 per cent might well be added to such a schedule, bringing the total up to nearly double what is now planned. It seems to be overlooked that we have allies as sorely in need of rubber as we are.

There has been much propagandizing for an "all out war effort," meaning that every activity not essential to warfare should be discontinued. But we have seen no survey of the number of men who can be employed in manufacturing war equipment and supplies. This probably means that no such survey has ever been made.

About one-fifth of our 52,000,000 workers were idle when we began our lend-lease program of aid to the allies. It is questionable whether our factories, mines and other sources of raw materials, can use 10,000,000 em-

ployes on war work. It follows that to curtail road work, for example, is an economic blunder, provided that it involves the use of no considerable amount of steel. If road workers were needed in factories the horse would be of another color. But even yet there are millions of workers left idle by the depression that started in 1929; and, in addition to these, many thousands are still to be seen in every section of America puttering around W.P.A. projects! Over the radio and in the press, we are told that this is to be an "all out war"; while just around the corner any one can find a group of "shovel leaners" on a W.P.A. job. Soon they will be joined by road workers, whom Major Priorities has picked out of well managed, useful work into ill managed and often unneeded work.

We shall welcome from *Collier's* as good and timely an editorial on "all out war" effort as the one on the synthetic rubber program.

Food for the Army

PROVISIONING our rapidly expanding army is no small task. It involves the establishment of purchasing centers and the transportation of food stuffs from the points where they are produced, through the processing plants to the points where they are distributed, then to the camps, posts, fields, plants, and stations where they are consumed. The Quartermaster Corps has established strategically located warehouses and purchasing centers to accomplish their task. In Chicago, for example, a central headquarters is established for buying and in some cases handling vegetables, fruits, dairy products, and meats through the commercial marketing channels. In San Francisco, because of its proximity to the fruit growing centers, canned fruits are purchased and warehoused.

All of these products move by the various transportation facilities but in every case, roads must be employed at both ends and often as the principal trackage. Just as food moved in peace times to and through the commercial marts of the country, so does it during this war emergency. Trucks are mandatory and roads are imperative. The despatch with which food stuffs move over rail, air, and water routes is partly dependent upon how efficient the road systems are at collection and distribution points.



MEETING THE EMERGENCY

Reflector Signs now easily made with "REFLECTO-CHAIN"



FOR BLACKOUTS

Available in luminous finish to reflect with light and glow without light—a recent foreign development.

"REFLECTO-CHAIN" is meeting the emergency created by steel shortages. Easily attached to Wood or Plywood as well as steel. Flexible as a string . . . any size or style of letter, figure or symbol can be easily formed and mounted on used or new materials. Quick, simple, inexpensive. Many different treatments possible (see illustration). Write for descriptive literature and prices Reflecto-Chain and also Pavement Markers. Send for trial shipment today.

Manufactured under U.S. Pat. Nos. 2,240,777; 2,113,759.



Buy
VICTORY BONDS
WITH THE MONEY
ETNYRE
SAVES FOR YOU!



SAFE!
SPEEDY!
ACCURATE!
DEPENDABLE!
CONVENIENT!

- "Uni-Flo" non-clogging, triple-lap nozzles
- Non-pulsating, powerful rotary pump
- "Hi-Speed" heating—low cost fuels, full length flues
- Simple rear end control
- Valves controlled from either side of platform
- Two-speed, heavy-duty transmission
- "Leakless-type" transfer valve
- Cross-connected "Butterfly" return valve
- Ball-and-socket joints
- Tachometer, Bitumeter, thermometer, tank gauge
- Slide-rule type "computer"
- Loading hose and connections
- Tank car coupling
- Hand spraying attachment

SEE YOUR DEALER or write us today for copy of "Foto-Facts" pictorial catalog
E. D. ETNYRE & CO., OREGON, ILLINOIS, U. S. A.

ETNYRE

BLACK TOPPER

BITUMINOUS DISTRIBUTORS

HERCULES

KEEPS 'EM DUMPING



Successful performance depends upon the ability to get into action *fast*, doing the most work with the least effort. Hercules SPEEDRAULIC Hoists are fast acting because they are powerful, double arm, center lift hoists. They lift ahead of load center—no strain—no high oil pressures—no gadgets.

Over 80 Hercules distributors, in all parts of the United States, guarantee prompt attention to your requirements for both new equipment and repair parts.

Hercules SPEEDRAULIC Hoist model 10X and Hercules rock body of 13 cu. yd. capacity. 6", 7", 8" and 10" center lift hoists are available for every type of service. Write for Bulletin 48R.

◆ **HERCULES** ◆
STEEL PRODUCTS CO.
GALION, OHIO

ROADS AND STREETS, May, 1942




Cut
YOUR MIXING
Costs


Modern bituminous mixing equipment is essential in meeting short time limits on many defense projects, but the production of this equipment is necessarily limited. While this company's facilities are being used entirely in the war effort, a limited number of bituminous plants for defense purposes are available.

WE INVITE YOUR INQUIRIES.

 *Hetherington & Berner Inc.*
INDIANAPOLIS, INDIANA



Mr. Check says:
"J&L PERMASET
Pre-formed
Wire Rope
has
reserve strength."



J&L WIRE ROPE

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
WILMORE WIRE ROPE DIVISION • PITTSBURGH & MUNCY, PA.

How to Secure Certificate of Necessity for Bituminous Materials

Procedure to be followed by governmental agencies in 17 Atlantic Seaboard States in applying for bituminous materials for highways was announced May 5 by the Public Roads Administration of the Federal Works Agency, official certifying agent for the Petroleum Coordinator for War.

The Procedure was drafted in accordance with the April 24 "Recommendation No. 45" of the Petroleum Coordinator for War that road or street use of asphalt or of any asphaltic product, including road oils, or of tar or any tar product, shall be deferred for the duration of the emergency, except in the case of projects certified by the Public Roads Administration as "necessary to the successful prosecution of the war."

The Petroleum Coordinator's recommendation was based on the shortage of tankers and tank cars in relation to the exceptional wartime demand for their services and on the extensive requirements for war uses

of the available supplies of bituminous materials.

It is directed to all governmental agencies "having jurisdiction over the construction, reconstruction, maintenance, or repair of roads and highways . . . and to all suppliers of asphalt and asphaltic products and tar and tar products" in the Atlantic Seaboard area.

It applies to all eastern seaboard States, including the District of Columbia; and to Vermont, New York, and Pennsylvania. Its application in Florida, however, is limited to the area east of the Apalachicola River.

An applicant for "a certificate of necessity of use of bituminous road material" must be the "authorized representative of the governmental agency having jurisdiction over the roads, streets, or highways on which such use is to be made," according to the Public Roads Administration.

Applications must be made on a

special form (PRA-B-1), copies of which are available from State highway departments or district or State offices of the Public Roads Administration.

The official applicant must supply "all pertinent information required for a finding by the Public Roads Administration that (1) the road, street, or highway described is necessary to the successful prosecution of the war, including the continuing accommodation of essential civilian traffic, and (2) the proposed use of bituminous road material is essential in the kind and amount described."

These two points are the basis of review and approval or disapproval of applications by all officials authorized to perform this function.

All applications except those of Federal agencies must be submitted to the State highway department of the State in which the road or street described is located. This department reviews and recommends approval or

disapproval of each application and then forwards it to the District Engineer of the Public Roads Administration.

The District Engineer is authorized to give final approval to all applications relating to road or street projects previously certified as important to national defense by the War or Navy Department or other appropriate national war agency, and to projects for which a Project Conference Rating Order P-19e has been issued or which is covered by a Preference Rating Certificate PD-3A with respect to any critical material involved. His approval is contingent upon his finding that use of bituminous material of the kind and in the amount applied for is essential.

The District Engineer will disapprove all applications relating to roads and streets determined generally by Public Roads Administration to be ineligible under the limitations of Recommendation No. 45.

All applications will be returned to the applicant with approval or disapproval indicated by either a District Engineer or the Washington Office of the Public Roads Administration. An approved application or a photostatic copy is to be accepted by suppliers of bituminous road ma-

terial as evidence that such materials may be purchased in the kind and amount designated.

Interpretation of Preference Rating Order P-100 Covering Repair Parts For Rental Equipment

In response to a request made by Associated Equipment Distributors for an interpretation of P-100 to allow dealers who own construction equipment for rental service, to use P-100 in obtaining repair parts for such equipment, the following interpretation was received by them from Mr. Dean C. Gallagher, Chief, Maintenance and Repair Section, Production Requirements Branch, O.P.M. and they advised of it by their General Letter No. 13, of Jan. 23, 1942.

"This order (P-100) may be used to purchase repair or maintenance material used in repairing construction equipment for rental; and the A-10 rating may be applied to orders covering such material.

"This order is designed to repair existing construction equipment and may not be used to replace complete units; nor to repair construction equipment for sale."

AED Semi-Annual Meeting and Distributors Week

The 23rd semi-annual meeting of the Associated Equipment Distributors will be held at the Edgewater Beach Hotel, Chicago, June 8, 9 and 10 in conjunction with Distributors Week.

The sessions all day Monday, June 8, and the morning of Tuesday, June 9, will be closed to all except regular members. The sessions of Tuesday afternoon and Wednesday morning, June 10, will be open for regular, allied and associate members. Wednesday afternoon will be devoted to Manufacturers Group Meetings.

AED president, T. W. Harron of San Francisco, Calif., will preside. First Vice-President Ed. P. Phillips of Richmond, Va., chairman of the program committee, is now arranging a program of speakers on subjects effecting the construction machinery industry. A. F. Sersanous, member of the Board of Governors, of Portland, Ore., will be chairman of the entertainment committee. Social activities are stressed more at the mid-summer meetings of AED than at the January meetings and members are urged to take their ladies.

Renewable TRACTOR RIMS

FOR CATERPILLAR TRACTORS



MADE OF
WEAR-RESISTING
STEEL

Sturdy steel replacements for Caterpillar Tractor drive sprockets and idlers... Designed for extra long life and heat-treated with proper toughness to guard against breakage... Easily applied on your present equipment at less cost than entire unit... Conserves essential war materials... Welding instructions furnished.

ALLOY STEEL & METALS CO.
1862 E. 55TH ST. LAFAYETTE 0181 LOS ANGELES, CALIF.
Manufacturers of PACIFIC CRUSHING & SCREENING UNITS • PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • ALLOY-MANGANESE MILL LINERS & CRUSHER JAWS • PACIFIC ROCK BIT GRINDERS • HAND WINCHES • CRAWLER SHOES, TRACTOR RIMS and other Wearing Parts

Write for
BULLETIN

Prolongs Life of Sprockets and Idlers

ROADS AND STREETS, May, 1942

Sauerman LONG RANGE MACHINES



Drag Scraper cuts into hill and hauls gravel to screening plant conveyor.



Blackline Cableway cleans out a tailrace, moving thousands of tons of rock from stream to shore pile.

Labor Savers and Cost Reducers

- **Sauerman Slackline Cableways** perform a triple service, digging, carrying, and lifting, when you have a job of making a deep excavation or moving material from a river or pond.
- **Sauerman Power Drag Scrapers** are the world's most economical self-loading and self-dumping units for bank excavating, surface mining and stockpiling.
- **Sauerman Tower Excavators** are unequalled for excavating work that calls for long, continuous cuts as in digging canals, building levees, or strip mining.

Write today for our free catalog—it's chuck full of valuable information on easy ways to do tough jobs where sand, gravel, clay, loose rock and other bulk materials must be dug (or reclaimed) carried, and placed within a range of 1500 feet.

● **SAUERMAN BROS., INC.** ●
588 S. Clinton St. - - - - - Chicago, Illinois

A NEW COST DATA BOOK

Road and Street Construction Methods and Costs

BY
HALBERT P. GILLETTE
AND
JOHN C. BLACK

This book was planned and compiled expressly for use by contractors, engineers and highway officials.

It is not a textbook, but it is a compendium of data carefully selected with reference to their usability by highway builders and other persons concerned with highway construction costs.

In general the data are of two main classes—dollar and cents costs per mile, per square yard, per cubic yard, and the like, for use in quick approximate estimates; and details of material, labor and equipment costs, with records of man-hours and machine-hours, for use in close estimating and in studies to reduce costs or improve methods.

The data are from a great number of different sources, and are in widely varying detail.

All major articles carry descriptions to show clearly the class of work and the methods for which costs are given, and to provide a basis for further reference and study if desired.

Location and date of job and the source of information are given in the title and introduction to each article.

The grouping of subjects in chapters is convenient, but an unusually complete index is furnished as the main guide to any subject or sub-subject sought.

The authors are both men of practical experience in highway and other construction. Both are members of the American Society of Civil Engineers.

The book is filled with useful data, and its answers to just one question may easily be worth hundreds of times its price.

608 pages—hard cloth binding—price \$6.00
Sent, if desired, with 10 days approval period.

GILLETTE PUBLISHING COMPANY
330 SOUTH WELLS ST. CHICAGO, ILLINOIS

Equipment Rental Prices Issued by OPA

RENTAL prices for construction and road maintenance equipment have just been issued by the Office of Price Administration as Maximum Price Regulation No. 134. A statement of considerations involved in establishing and promulgating these rental rates is contained at the end of the 22-page order. It follows:

History and Development

The business of renting construction and road maintenance equipment began prior to 1932 and had its inception in the practice followed by dealers of renting trade-ins to prospective purchasers on an accommodation basis and in the practice followed by contractors of leasing idle equipment to fellow contractors at very low rates.

During the period 1932-1940 many contractors accumulated large inventories of construction and road maintenance equipment. Early in this period, contractors used their own

equipment on these projects, but the continuing overhead of obsolescence and depreciation, whether or not the equipment was used, and the effects of the economic depression forced many contractors to rent rather than to own such equipment.

These factors gave impetus to the rental business which increased rapidly in volume. By 1940 the rental business was thoroughly established, and leasing arrangements were entirely disassociated from the earlier sales-accommodation practices.

During this period several types of rental sources came into existence. At the present time equipment distributors or dealers, equipment rental agencies and contractors who have accumulated an inventory of construction and road maintenance equipment all engage in the business of leasing construction and road maintenance equipment. Equipment distributors or dealers have used rental transactions very largely in realizing a return upon used equip-

ment received as a trade-in on the sale of new equipment. As sales of new equipment diminish, due to curtailment of supply, rental transactions will become the predominant source of distributors' or dealers' income.

When rental prices were first developed, rental rates were determined by rough calculations based upon the original cost of the equipment, without adequate knowledge of the costs of maintenance, repair and overhead. The cost to the owner of renting such equipment was seldom determined upon any accurate basis of cost accounting. This condition can be explained by the fact that most lessors were concerned primarily with the sale of new equipment, which was the profitable aspect of their business, rather than with the development of a self-sustaining rental department. But with the steady increase in rental business, contractors and equipment lessors introduced more precise records for determining the cost of owning and renting equipment, and from

information obtained by this method, rental schedules appeared and went into local use in various areas over the country.

In 1920 the Associated General Contractors, a trade organization, assembled and analyzed for the guidance of its members, information relating to the cost of owning and maintaining construction and road maintenance equipment. Such information was published in a schedule which has come to be known as the Associated General Contractors Schedule or A. G. C. Schedule. This schedule is employed by contractors as a guide for making estimates when preparing bids on jobs. Since this schedule includes no allowance for general overhead and profit, it serves to determine cost of ownership and does not directly reflect actual rates at which equipment may be leased.

Within the last few years, the Associated Equipment Distributors, another trade organization in this field, realizing that its members were entering the equipment rental field on an increasing scale, canvassed the rental operation of its members, and on the basis of information thus obtained compiled a rental schedule. The rates in the Associated Equipment Distributors' schedule are generally higher

than those in the A.G.C. Schedule. Interviews conducted throughout the country by representatives of the Office of Price Administration during the months of March and April, 1942, reveal that few distributors adhered strictly to the rates published in this schedule, although most were acquainted with the rates and used them as a guide.

Types of Rental Practices

It is a general practice among distributors and dealers and equipment rental agencies to rent equipment upon the understanding that the lessee maintain the equipment during the rental period. At the end of the rental period and before the equipment can be rented to another user, the lessor must inspect and overhaul each piece of equipment.

In many areas, contractors favor renting from fellow contractors rather than from other agencies. Contractors leasing equipment to others prefer to do so on an hourly basis at a rate including operator, fuel, and maintenance charges, so as to keep their experienced operators steadily employed, and, in their opinion, to minimize their maintenance and repair costs.

Another practice worthy of mention is the use by the War Department,

for over twenty years, of a "recapture clause" in contracts for rental of equipment. This clause grants the War Department an option to purchase rented equipment whenever the total rent paid becomes sufficient to create a substantial "equity" in the equipment. The clause afforded effective protection against high rates, since, by exercising the option, the Army could take ownership of the equipment when the total rent paid amounted to the list price of the equipment. For reasons discussed below, the Army has now ceased using such a clause.

History of Action by the Office of Price Administration

In the construction and road maintenance field, the Office of Price Administration first moved against rising selling prices of new equipment. It requested manufacturers of such equipment, by letter dated November 15, 1941, and dealers and distributors, by letter dated December 29, 1941, not to exceed their October 1, 1941, prices in the sale of new construction and road maintenance equipment.

The construction rental program, which has culminated in this Maximum Price Regulation, was first discussed with the industry at a meeting



EVEN SIDEWALK SUPERINTENDENTS KNOW A GOOD BUCKET WHEN THEY SEE IT

Of course they judge on how quickly it buries itself for a big pay load, how it swings without spilling, to dump smoothly and cleanly into the waiting truck. They don't know, as the contractor's superintendent does know, how long Williams Buckets last with little maintenance expense, and how well they deliver on the toughest hardpan jobs or handle rubble or concrete chunks.

THE WELLMAN ENGINEERING CO., 7003 Central Ave., Cleveland, Ohio

WELDED
ROLLED STEEL CONSTRUCTION
for GREATER STRENGTH and SPEED

If you want the engineering reasons why it will pay you to make your next bucket a Williams, send for descriptive bulletins.

Distribution in all parts of the country.

WILLIAMS *Buckets*
built by WELLMAN

of equipment distributors and dealers in Chicago, Illinois, on January 10, 1942. At all stages of preparing this Regulation an effort has been made freely to consult with members of this industry, to receive and consider their suggestions and advice, and to obtain full and accurate information on current practices. In fulfillment of this effort meetings of small groups of equipment lessors were held during March and April of this year in Atlanta, Jacksonville, Miami, Seattle, Portland, San Francisco, Los Angeles, Dallas, Detroit, Chicago, Boston, Buffalo, and New York. Several conferences were also held in Washington, D. C.

The Need for Price Regulation

Surveys conducted by the Office of Price Administration have disclosed that rental prices since 1939 have risen sharply and threaten further to rise. Unless a brake is placed upon this trend, public appropriations will be dissipated and enormous and unjustifiable costs will be added to the war program.

The pressure against rental prices has stemmed from top sources: curtailment of production of new equipment and unprecedented demand for rental of equipment, especially by the armed forces. With these developments, construction and road maintenance equipment has assumed new strategic importance.

Curtailment of Production

Early orders issued by the War Production Board and its predecessors, the Office of Production Management, limiting the use of basic metals and raw materials directly affected manufacturers of construction and road maintenance equipment. Production, at peak figures in 1939, tapered off. At the same time the drive for vast expansion in the production of military tanks and combat vehicles of all kinds made itself felt in this industry. Production facilities of many firms were converted to the manufacture of weapons of war. Finally, with the issuance of orders by the War Production Board¹ curtailing production and restricting sales of such equipment, it was clear that the pool of existing equipment would not hereafter be appreciably enlarged and would have to serve for the duration. What is more, all existing equipment was, and still is, not immediately available for

rental purposes. A considerable quantity of such equipment is in the hands of municipalities, institutions, and private owners. The lapse of time before such equipment will move into rental channels will place further pressure on the price structure.

Increase in Demand

Although the demand created by private construction jobs has been virtually eliminated, the defense housing projects and the building program of the armed forces have created a demand far beyond the capacity of available equipment. It is estimated by the Office of the Chief of the United States Engineers and the Office of the Under-Secretary of War that approximately 90 per cent of all construction and road maintenance equipment is today directly employed in the war effort—in the prosecution of the far-flung program to build cantonments, air fields, and other military projects.

Finally, the safeguard against exorbitant rentals exercised by the Army "recapture" clause, to which reference has been made above, is now unavailable. The Army's option to purchase equipment at any time that the total rent paid amounted to the list price of the equipment operated to check rental rate increases. Within recent months, strenuous opposition by lessors of equipment has developed against this clause and in the face of these objections, the Army has abandoned its further use.

Rapidly these several events have shaped themselves to their appointed conjunction. The history of rental rates since 1939 is the story of striking and critical increases. By surveys conducted by the Office of Price Administration and the Bureau of Labor Statistics, average monthly rental rates of the major items of equipment used in various construction projects have been collected and tabulated.

Maximum Price Regulation No. 134

Maximum Price Regulation No. 134 requires lessors of construction and road maintenance equipment to rent such equipment at prices or rates no higher than those shown in Appendix A, Section 1399.10 thereof. Specific rates per day, per week, and per month have been established for virtually all types of equipment. In determining these rates the Office of Price Administration gathered data as to actual rental rates charged throughout the United States on all different types of construction and road maintenance equipment under leases made or in effect during the

period October 1-October 15, 1941. These data show that it was the practice of equipment lessors to charge a rental rate, the dollar amount of which was based on a percentage of the list price of such equipment. This percentage figure took into consideration depreciation, overhauling, interest, taxes, storage, insurance, painting, repairs, and an allowance for profit. It has been determined that during this period, as in any other period, this percentage varied somewhat on the same piece of equipment from area to area over the country, due to local factors of supply and demand, peculiar geological conditions on a given construction project, such as abrasive soils, adverse weather conditions which accelerate the wear and tear on equipment, the type of maintenance supplied by the lessor during the term of the lease, and the number of shifts for which the machinery was to be used. Such variations were, however, relatively small and insignificant.

Accordingly, in determining the rates contained in the Table of Rates, the Office of Price Administration translated the rates for each type of equipment in effect during the period October 1-October 15, 1941, into a percentage of the list price of such equipment when new. This percentage for each type of equipment was then averaged to arrive at an over-all national percentage for such type of equipment.

This average percentage for each type of equipment was then applied to an average of the October 1, 1941 list price for all equipment within that type, thereby arriving at a dollar rental rate which represents the over-all average rental rate in effect during the period October 1-October 15, 1941 for such type. Rental prices or rates, thus calculated, were compiled for substantially all known types of construction and road maintenance equipment subject to rental. They have been set forth in the Table of Rates, Section 1399.10 (f) of the Regulation.

The methods employed in calculating the rates contained in this Maximum Price Regulation were thoroughly canvassed at many well attended meetings with lessors of construction and road maintenance equipment held in various sections of the country and received general approval. At these meetings, proposed rates for many types of equipment were examined and discussed, and met with approval by a substantial majority of the industry. The rental rates contained in this Maximum Price Regulation are in line with the

¹ Limitation Order L-53-A issued April 9, 1942 prohibits manufacture of track laying tractors in excess of amounts specifically assigned to each producer for the period April 1-August 31, 1942. Limitation Order L-53 issued March 19, 1942 prohibits the sale of new track laying tractors except to purchasers having a preference rating of A-2 or higher.

rental rates generally prevailing during the period October 1-October 15, 1941 throughout the country.

It was believed preferable to provide uniform maximum rental rates throughout the country, rather than to perpetuate local variations, which in themselves were not clearly established, and which frequently found no justification in working conditions. Moreover, such variations, as noted above, were found to be relatively small and insignificant. In fact variations between jobs within each area were found to be as great as variations between areas.

While cost and profit data relating to the lease of construction and road maintenance equipment are not available, either for past or current periods, the general approbation of the method of calculating the rates contained in the Table of Rates by lessors of equipment and also by the Army and Navy, now the principal users, validates the conclusion that they are fair and equitable.

In every instance, the Regulation preserves prevailing industry practices in computing rentals in special situations. Section 1399.10 paragraphs (a), (b) and (c) of the Regulation perpetuate the prevailing methods of computing rentals for overtime use. Section 1399.10, paragraph (d) incorporates the current practice of giving the lessee the most favorable basis of computing the rental charge where, for example, the lease is made on a daily basis and the rent, on a weekly basis, is less. Finally Section 1399.10, paragraph (e) preserves to lessors who on April 15, 1942 had an established practice of requiring minimum rentals, the benefits of such arrangements provided satisfactory proof thereof is filed with the Office of Price Administration within fifteen days after the effective day of the Regulation.

Attention should be called to Section 1399.4, the "Evasion" provision of the Regulation, which prohibits, among other things, evasion of the Regulation by changing an adjunct or tool of any equipment in order to increase the capacity of such equipment beyond the manufacturers' rated capacity so that a higher rental rate may be charged.

Finally, while this Regulation does not establish maximum charges for field repair services or for repair parts, it should be noted that such services and the sale and deliveries of such parts are subject to the provisions of the "General Maximum Price Regulation."

Issued the 28th day of April, 1942.

New Trucks Released

The War Production Board announced on April 29, 1942 that it has released 19,351 trucks and truck trailers under the rationing program set up March 9 by General Conservation Order M-100. Most of the trucks released have gone to war agencies or for foreign governments, Lend-Lease operations or general export purposes.

Since the rationing plan went into effect, the Board has approved the sale by dealers of 1,099 light trucks, 3,027 medium trucks, 1,859 heavy trucks, 893 trailers, for civilian use.

Trucks released for war agencies totaled 3,901 light, 6,258 medium,

1,997 heavy and 317 trailers.

The rationing plan, administered by WPB in cooperation with the Office of Defense Transportation, went into effect March 9. Vehicles released to the Army and Navy and other designated war agencies were covered by a Governmental Exemption Permit. Those released for civilian use were cleared through the application procedure set up under order M-100. These civilian applications were first cleared through local allocation offices of ODT before they were finally passed upon by the Washington headquarters of ODT and WPB.

In Sand or Hardpan — Whatever the Load —



There's Always Exactly the Right Amount of Power...with a Pierce Governor!

● Few conditions require a governor to be more accurate and sensitive, yet rugged and thoroughly dependable, than grader work. The load on the grader varies throughout the full range, suddenly, unpredictably—as it scrapes through soft surface dirt into hardpan, clay, rock . . . and out again. Then *instantly—automatically*—Pierce Flyball Governors adjust the throttle of the motor to handle the changing load without stalling or racing!

This takes sensitive, split-second control, which Pierce Flyball Governors have long demonstrated in actual service in many fields. Efficient design, precision construction, special heat treatment and hardening, and over-size ball bearings assure minimum wear and long life in toughest service. That's why leading equipment manufacturers use Pierce Flyball Governors as standard equipment! That's why it will pay you to insist that any equipment you buy, requiring a governor, is Pierce equipped!

When Your Equipment Needs Reconditioning check the governor. It may need repair or replacement, too. A new Pierce Governor will help restore peak performance. Get in touch with your nearest Pierce distributor, or write the factory.

THE PIERCE GOVERNOR COMPANY
1657 Ohio Avenue, Anderson, Indiana

INSIST ON PIERCE Flyball GOVERNORS on

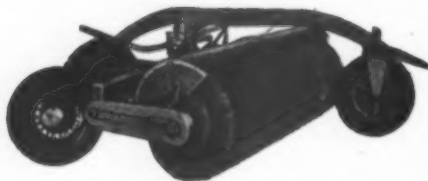
- Power Graders
- Scarifiers
- Rollers
- Crushers
- Sweepers
- Shovels
- Ditchers
- Earth Movers
- Loaders
- Bituminous Spreaders

More Accurate, Last Longer, Give You Peak Performance From Your Equipment.

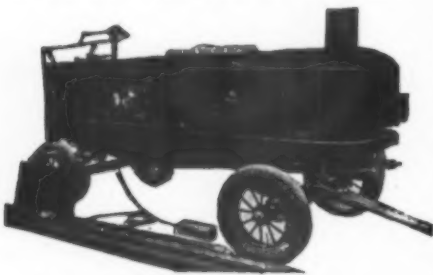
Pierce Governors

ROADS AND STREETS, May, 1942

GRACE



2-WAY AXLE DRIVEN SWEEPER RAPID FIRE HEATER



- *Grace 2-Way Axle Driven Sweeper*—the modern traction driven sweeper that successfully meets the sweeping problem of any contractor.
- *Rapid Fire Heater*—A fast-pumping, fast-heat circulating heater that heats 10,000-gallon insulated cars at 40-50° per hour. Write for information and prices.

W. E. GRACE MFG. CO. 6000 Holmes St.
DALLAS

BURCH



MATERIAL SPREADERS

STONE — CHIPS — SAND
CINDER — CHLORIDE

The most complete line of spreaders on the market. From the base course at the time of construction to winter ice control on the finished road.

Write for Catalogue.

Manufactured by
THE BURCH CORPORATION
Crestline, O.

Builders of Equipment for more than
fifty years.

Blaw-Knox Establishes Clearing House to Help Construction and Conserve Materials

An interesting plan to serve the multiple purpose of getting business for distributors, finding equipment for contractors, and conserving important war materials has been put into effect by Blaw-Knox Company of Pittsburgh. Briefly the plan consists in establishing a national clearing house for used construction machinery through the offices of the company and its distributors.

All persons needing equipment of the types manufactured by Blaw-Knox are asked to communicate with the nearest distributor, or with the

company direct; and those having idle equipment are asked to do likewise. The company will then put these people in touch with one another in all cases where a sale or a lease seems possible. The service is entirely gratis, and Blaw-Knox takes no part in the transaction beyond establishing contacts.

This plan is a good illustration of efforts being made by many American manufacturers to keep their country's business as near to normal as possible, without reference to immediate—or even ultimate—profits.

About Contractors and Their Jobs

Kansas City Area

REPORTED BY
PAUL L. MATCHETTE

The Missouri State Highway Commission plans to apply \$6,000,000 in 1942, toward the building of new roads in the State. The Commission has set aside \$1,500,000 to pay its share (25%) of access roads construction. Of the money that the State Highway Department receives from gasoline tax and automobile licenses, approximately \$8,000,000 will be used for Bond interest and retirement.

Due to the unsettled condition, account of the shrinkage in gasoline taxes, the Commission has decided to put into a sinking fund approximately \$9,000,000, which will be used to take care of Bond interest and retirement for 1943. The Commission has decided not to cancel any contracts which have already been awarded, unless requested to do so by the Public Roads Administration, or the War Department.

They will cut down on maintenance expense as much as possible. Already, they have reduced the State forces, employed by the Highway Department approximately one-fourth. Other State Departments, such as the State Treasurer's Office and the Auditor's Office, which are given part of the Highway funds for the collection of gasoline tax and for the sale of license tags, will make a similar reduction.

It is estimated at present that the amount of State Highway contracts let this year, will amount to approximately one-half of that let in 1941. To this will be added appropriations of the War Department, money which the Government has allotted for flight Strips and new roads that may be deemed necessary for troop movement and operation.

Black and Veatch, Consulting En-

gineers, Kansas City, Missouri, are doing a big job in war and defense construction. Besides designing and supervising Camp Chaffee, Arkansas, near Fort Smith, and the new Navy Super Airport, at Gardner, Kansas; they are now designing and supervising the construction of the new Army Cantonment at Pando, Colorado. This Camp is located in the Rocky Mountains, southwest of Denver, under the jurisdiction of the U. S. Engineer Corps, Salt Lake City, Utah.

Willard Ransom, of the well-known contractors, Cook and Ransom, Ottawa, Kansas, recently won ribbons at the Kaw Valley Guernsey show, Olathe, Kansas, on the junior champion bull, the junior champion heifer and the grand champion cow. Mr. Ransom has one of the show places of eastern Kansas, located near Homewood, in Franklin County, a short distance from Ottawa.

Willard Ransom is one of the best-known contractors in the State. For many years, Mr. Ransom specialized on city pavements, especially brick, in Kansas and Oklahoma. For the past thirty years, he has been a familiar figure at the City and State Highway lettings. Mr. Ransom is still a young man and is very active in the construction field. In his younger days, he spent several years in construction work in South America. It is always a pleasure to visit with Willard Ransom. He is one of the best-liked men in the Southwest construction industry.

W. E. (Bill) Miller, president of the Union Road Oils and Asphalt Company, B. M. A. Building, Kansas City, Missouri, has been passing out Corona-Corona cigars, the \$.50 variety, lately. Bill is the proud father of a fine, husky, baby boy; named Jerry William Miller.

Now, Bill, the father, is perhaps one

of the best asphalt salesmen in the U. S. He insists that Jerry is going to be still better. Congratulations, Bill!

C. A. (Zeke) Forter, general superintendent, Mixed Concrete and Supply Company, Wichita, Kansas, is perhaps one of the busiest men in the city of Wichita. And, if you have been in Wichita lately, you will appreciate what that means. For Wichita has jumped in population during the past year, from 115,000 to 170,000; and according to some estimates, will go to 250,000 by this time next year, if the airplane industry keeps on expanding.

Zeke hails from Marysville, Kansas, where he was a neighbor of Guy Helvering, National Commissioner of Internal Revenue, and Lynn Broadrick, National Democratic Committeeman for Kansas. Zeke is a graduate engineer of Kansas University, and saw service in the Army in France during the World War I.

Zeke Forter is an expert on asphalt pavements. It is said that he is one of the ten best asphalt men in the United States. He knows street pavement and road construction from every angle. He is associated with Hale T. Ritchie and Proctor Ritchie. These three men have built an enviable business, and are doing a real job in handling the vast amount of work required by a city expanding as fast as Wichita is at present.

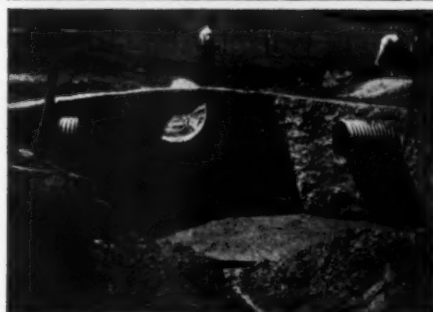
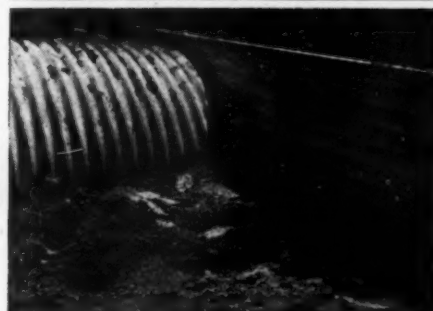
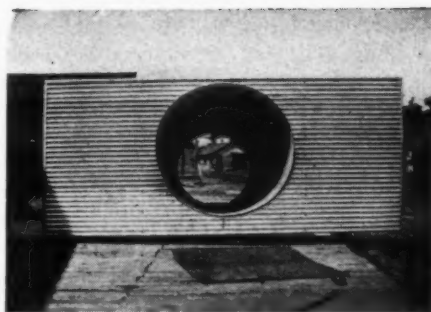
Right now, they are grading and laying streets on a new 80 acre addition on land owned by Mr. Ritchie, just east of the Country Club.

The Metropolitan Construction Company, Tahlequah, Oklahoma, is owned by Mr. R. C. Dohe. This company, in connection with M. W. Watson, of Topeka, Kansas, has the contract to build the Ada, Oklahoma Airport, under the U. S. Engineer Corps of Tulsa, Oklahoma.

Mr. Dohe will mix and lay the asphalt runways with his asphalt plant and finishing machine. Mr. Dohe has just finished mixing the hot asphalt on the Muskogee Municipal Airport job. He has also just recently finished the laying of several miles of street pavement in the city of Muskogee.

In the city of Tahlequah, Oklahoma, Mr. Dohe has laid in the neighborhood of 100 blocks of asphalt pavement. Also, he has laid several miles of sewer and water main, has constructed several bridges for the city.

Mr. Dohe is one of the best known engineers and construction men in northeastern Oklahoma. We predict that Mr. Dohe is due to be one of the "big four" in the construction industry in Oklahoma.



CONFINING THE WORLD'S MOST DESTRUCTIVE FORCE

Water out of control is the most destructive force in nature. Engineers have done much to conquer this menace. The Nation's great networks of highways, landing fields, airports, camps and training grounds must be kept free from the hazard of floods. To accomplish this, wholly dependable, trouble-free drainage structures, able to withstand crushing punishment and abuse, are a primary requirement. Such drainage structures are best made of GOHI Pure Iron-Copper Alloy, the longest-lasting, low-cost ferrous culvert metal. Write fabricator nearest you for free copy of 72-page book on modern drainage practice.

New England Bolt Co. . . . Everett, Mass.
Central Culvert Co. . . . Ottumwa, Iowa
Capital City Culvert Co. . . . Madison, Wisc.
Bancroft & Martin Rolling Mills Co. . . . S. Portland, Me.
Denver Steel & Iron Works Co. . . . Denver, Colo.
The Lane Pipe Corporation . . . Bath, N. Y.
Dixie Culvert Mfg. Co. . . . Little Rock, Ark.
St. Paul Corrugating Co. . . . St. Paul, Minn.
The Newport Culvert Co. . . . Newport, Ky.



Meets copper-bearing pure iron requirements in all specifications published by nationally recognized specifying authorities.

GOHI PIPE

CORRUGATED

GOHI CULVERT MANUFACTURERS, INC.,
NEWPORT, KY.

The Oklahoma State Highway Commission, which has occupied space on the first floor of the State Capitol for many years, is now located on the fourth and fifth of the new State Office Building. This new arrangement is one of the most modern of any state highway departments in the Southwest.

Michigan Area

REPORTED BY

J. M. TELFORD

Harry Pickitt, well-known road contractor whose home is in Allegan,

is the new president of the Michigan Road Builders' Association. Mr. Pickitt, who was advanced from the post of vice-president, succeeds Walter Toebe of Lansing.

Other new officers are Leet M. Denton of Detroit, vice-president, and A. H. Fry of Lansing, secretary-treasurer. Mr. Fry succeeds Larry Lamb of Holland, who had served in that capacity for the past 10 years.

Directors of the contractors' organization for the coming year are as follows: R. D. Baker, at large; Harry Whitman, asphalt; John W. Hertel, bridge; John G. Yerington, gravel;

D. B. Hamer, heavies; L. W. Edison and Edward W. Porath, paving; I. L. Whitehead, Upper Peninsula.

Herman Holmes is the Upper Peninsula vice-president of the association.

The officers were elected at the annual meeting of the MRBA in Lansing April 22, following which about 400 road builders and guests attended a banquet in the Hotel Olds. Speakers included Congressman Jennings Randolph, member of the House Roads Committee; Governor Van Wagener of Michigan; Lloyd B. Reid, Deputy Commissioner of the State Highway Department; and Burton F. Miller, executive assistant of the American Road Builders' Association.

During the afternoon business session representatives of the State Highway Department staff discussed forthcoming construction programs and proposed changes in specifications with the contractors.

Otto S. Hess, Engineer-Manager of the Kent County Road Commission, has been honored by election as president of the Michigan Engineering Society. W. B. Russell of Birmingham is the new vice-president; Lloyd B. Reid, secretary; J. H. Foote, Jackson, treasurer; and C. A. Sirrine, WPA Director of Operations, director at large.

Lee M. Perry of Beaverton, veteran road contractor, died April 8 in Ann Arbor following an extended illness.

The Cheney-Wright Company of Williamstown was awarded a contract for construction of about 10½ miles of oil aggregate surfacing by the St. Joseph County Road Commission.

Frank T. Evans, engineer for the Branch County Road Commission, has been granted a leave of absence to join the U. S. Army Engineering Corps. Carl Israelson, former Dickinson County Road Engineer and for the past 12 years engineer for the Bacco Construction Company, also has reported for duty with the Engineers.

Frank Pasco of Bennington has been appointed as a member of the Shiawassee County Road Commission.

Carl Krueger, who has been associated for many years with the R. D. Baker Co., of Royal Oak, is now associated with Julius Porath & Son Co., Detroit, paving contractors.

Low bidders at the April 22 State Highway Department letting included the following:

Herman Holmes, Crystall Falls,



BYERS CRANES

*Hoist while they Swing,
while they Travel,
while they Steer.*

You can set up a Byers crane on your job to take advantage of every time and money saving economy and to guarantee maximum production because its operations are free, not restricted.

This is another reason why you should investigate Byers ¾ to ¾ yd. excavators.

Modern CRANES and SHOVELS

BYERS

RAVENNA, OHIO

1.477 miles of concrete pavement on US-2, at \$56,852.54.

P. VanderVeen & Sons, Grand Rapids, 0.38 mile of grading and concrete pavement in Frankenmuth, at \$38,627.70.

C. G. Bridges, Escanaba, 3.55 miles of concrete pavement on US-2, at \$96,775.56.

Oak Construction Company, Royal Oak, 1.634 miles of grading and concrete pavement on M-17 relocation, at \$176,654.33.

Bridgeport Core Sand Co., Saginaw, 1.46 miles of grading and concrete pavement on M-17 relocation, at \$513,022.98.

Walter Toebe & Company, Munising, six-span grade separation on US-112 relocation, at \$130,959.40.

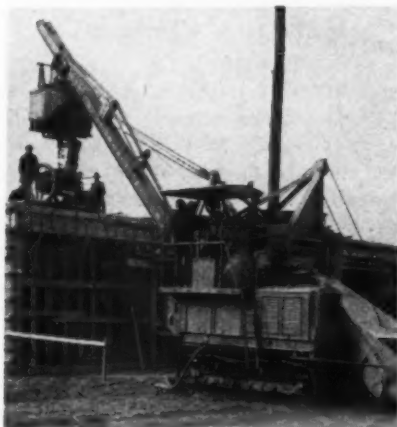
Andrew T. Barnes, Cass City, three-span grade separation on US-112 relocation, at \$45,995.46.

Taylor Bros., Inc., Birmingham, 2.97 miles of grading and concrete pavement on Detroit Expressway, at \$376,498.22.

New Equipment and Materials

New Inclined Boom Mixer for Building and Pavement Construction

The accompanying picture shows the MultiFoot 27-E inclined boom paver recently brought out by The Foote Company, Inc., of Nunda, N. Y. Foote also produces a 34-E unit with inclined boom. Both pavers are of the single drum type. The boom is 35 ft.



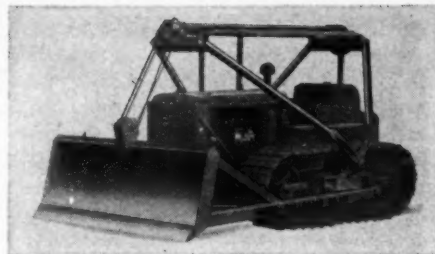
MultiFoot 27-E Inclined Boom Paver at work on Electric Steel Foundry's plant near Benton Harbor, Michigan

long and can be raised to an angle of 45 degrees. The 34-E paver has a power boom hoist, while the 27-E requires raising by hand. The bucket is hung from the boom by a special attachment which permits perpendicular suspension of the bucket regardless of the angle of the boom.

These pavers are different from the standard road paver in that they have a special drive mechanism for running the bucket up and down on the boom. The boom can be lowered to horizontal position and the special bucket drive disconnected so the paver can be used for regular road or airport work.

New Bulldozer

The J. D. Adams Co. has announced the addition of a bulldozer to its line of road building and earth moving equipment. The new bulldozer, known as the No. 181, has been specifically



Adams Bulldozer No. 181

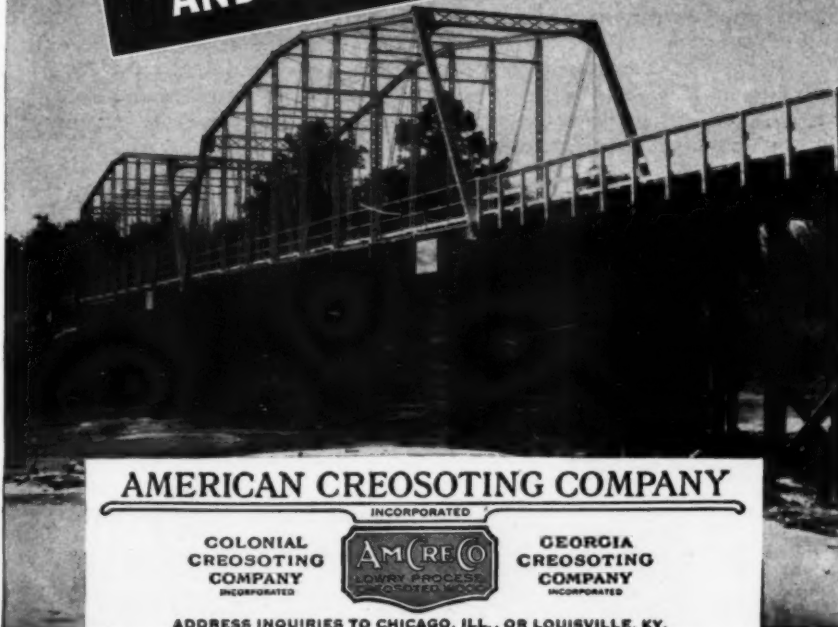
designed for use on TD-18 wide tread TracTracTors. It is single-cable controlled and is engineered to provide the even weight distribution necessary

DEFENSE HIGHWAYS!

*protect them
with*

AMCRECO
Creosoted
PRODUCTS

*for SOUND CONSTRUCTION AT
LOW COST WITH LONG LIFE
AND ECONOMICAL UPKEEP!*



AMERICAN CREOSOTING COMPANY

INCORPORATED

COLONIAL
CREOSOTING
COMPANY
INCORPORATED

AMCRECO
LOWRY PROCESS
REGISTERED TRADE MARK

GEORGIA
CREOSOTING
COMPANY
INCORPORATED

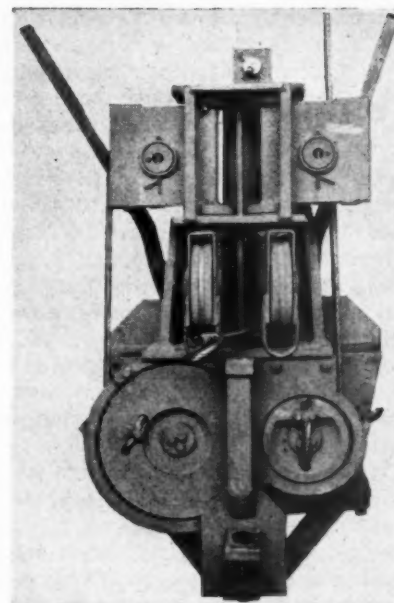
ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.

ROADS AND STREETS, May, 1942

for good balance and maneuverability. The moldboard is designed to keep earth rolling smoothly at all speeds and is wide and higher than most moldboards. A pusher attachment for use with scrapers is available. A convenient side-mounted control permits operator to sit in a natural position facing the blade. Operation is by means of an Adams No. 20 power control unit (single or double drum) or any other standard hoist attached to the power take-off of the tractor. For complete information and specifications write J. D. Adams Co., Indianapolis, Ind., requesting form 4121.

New Power Control Unit

R. G. LeTourneau, Inc., Peoria, Ill., has announced the Model GB4 power control unit for use on D4 "Caterpillar" tractors. This unit, developed primarily for military use, provides a single cable line for Dozer operation from one drum while the other serves as a winch with a line pull of 10,000 lb. The winch drum has a capacity of 265 feet of $\frac{1}{2}$ inch cable. The GB4 power control unit is stated to be more compact and to mount closer to the tractor than most units for small tractors, thus makes for better tractor balance. The clutch and brake are



New Power Control Unit

completely enclosed and run in oil for fast heat dissipation. Fewer parts than in former models greatly simplify adjustments and minimize repair. The same double-deck sheave assembly that is used on all other rear mounted LeTourneau power control units assures straight cable pull and reeving on the GB4.

New Transverse Blade Concrete Spreader

Blaw-Knox Co. has announced a new model transverse blade concrete spreader for airport and road building, with width adjustments up to 5 ft. By means of the adjustment, a 10 ft. spreader will extend to a maximum width of 15 ft., and a 20 ft. to a maximum width of 25 ft. The company offers a bulletin on this new spreader which shows the method of its operation in a step-by-step series of photographs and sketches. Also illustrated is the Blaw-Knox vibrator. Copies of this bulletin, number 1851, will be sent upon request to the Blaw-Knox Division of Blaw-Knox Co., Blawnox, Penn.

Diaphragm Pump

Improved models of its diaphragm pumps have been announced by the Construction Machinery Co., Waterloo, Ia. Exclusive features claimed for these pumps are: Timken bearing construction—full finished roller chain drive (every link a roller bearing—cut tooth sprockets completely enclosed—improved type, long service "basket weave" diaphragm—interuseable suction, discharge and clean-out locations. Two sizes of Wonder diaphragms are offered: 3 in. Model



BITUVIA ROAD TAR—Because of construction and maintenance economies and because of its traffic safety BITUVIA road tar construction offers distinct advantages to the contractor and to the public. Deep penetration holds the aggregate firmly for long service. BITUVIA is easily applied. It is highly resilient and skid-resistant. Made in seven types to meet any Federal, State, County or Municipal specifications.



PLASTUVIA CRACK FILLER

The unusual ability of this filler to withstand a wide range of temperatures—from bitter cold to torrid heat—without flow or traffic "pull" in summer, or chipping in winter, makes it an outstanding product. The ease with which it is applied, and the manner in which it holds tenaciously to concrete and brick surfaces characterize this material. Your inquiry will bring you further information about these products.

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana
2512 S. DAMEN AVENUE, CHICAGO, ILLINOIS 500 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.
FIFTEEN PLANTS TO SERVE YOU

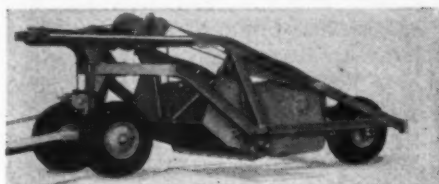


Wonder Diaphragm Pump

FD-3, 3000 G.P.H. at 10 ft. suction lift and 1500 G.P.H. at 20 ft suction lift 2½ H.P. engine; 4 in. Model FD-4, 6000 G.P.H. at 10 ft. suction lift and 3000 G.P.H. at 20 ft suction lift 3½ H.P. engine.

New Scraper

A new and improved scraper for use with International TD-18 TracTractors or other tractors of similar size has just been announced by the J. D. Adams Co. This scraper, known as the No. 90, has a heaped capacity of 10 cu. yd. Drop center bowl provides quick penetration and balanced loading while four large low pressure tires, over which the weight is evenly distributed, provide for easy hauling and plenty of flotation in soft material. A



Adams Scraper No. 90

70 degree dumping angle insures free discharge of material which can be spread evenly to any desired depth. Frame is all-welded, box-type construction with full oscillating front axle and tongue. All cables are in line down the center of the bowl and operation is easy and positive in action. Operation is through an Adams No. 20 power control unit or any standard 2-drum hoist connected to the power take-off of the tractor. For complete information and specifications write J. D. Adams Co., Indianapolis, Ind., requesting form 4120.

An-Cor-Lox Lock Nut Includes Cap Nut Shapes

Cap (acorn) shapes now are available in An-cor-lox lock nuts, according to the manufacturers—An-cor-lox

Division of Laminated Shim Co., Inc., Glenbrook, Conn. The cap nuts will be made up to users' specifications. A wide choice in materials for the nut body is offered, also considerable variation in the metallic composition of the locking ring insert. All standard sizes (measured by bolt diameter dimensions) are listed; obtainable with thick or thin walls. As is true of every type of An-cor-lox lock nut, the cap nuts are of all-metal construction and self-contained—the locking ring being made integral with the nut body; comprising a single-unit lock nut, notable for its quick easy handling.

All An-cor-lox safety features are retained.

New Scraper

To standardize and simplify its scraper line, R. G. LeTourneau, Inc., Peoria, Ill., has announced the Model D Carryall which will replace former models X and Z. The improved and newly designed small scraper has a struck capacity of 3.5 cu. yd. The Model D Carryall incorporates the same features of design and operation that are standard on all current larger Carryall models. Major changes from the X and Z include stronger and



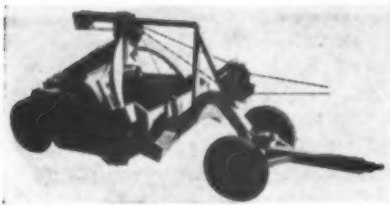
One glance at the photo above tells a story of smooth-working efficiency on this big southeastern airport — typical of airport and access road jobs throughout the

country being cured with SISALKRAFT. Saves Time — Man-power — Money. Only two men are required to unroll SISALKRAFT blankets, directly behind the finishers. Original mixing water held in . . . curing is automatic . . . no sprinkling at any time. Efficient . . . Foolproof . . . Smooth!

Blankets are re-used time after time — cut curing costs down to the bone — free man-power for other jobs. Keep work rolling on schedule. SISALKRAFT curing is in the Specifications of 42 State Highway Departments and on defense jobs in every section of the country and the outer island groups. Rolls, covers and blankets available in sizes to fit any job. Write for data, samples, and details of our on-the-job service. Distribution Everywhere.

The SISALKRAFT Co. • 205 W. Wacker Drive • Chicago, Illinois
NEW YORK - 101 PARK AVE. SAN FRANCISCO - 55 NEW MONTGOMERY ST.





Model D Carryall

heavier box-type construction; overhead spring pipe; large carrying apron; elimination of throw-arm for raising and lowering blade and bowl. The Model D Carryall scraper is designed to work with either the D4 or D6 "Caterpillar" tractor.

WITH THE MANUFACTURERS

Edwin J. Schwanhausser Elected Worthington Director

Mr. Edward J. Schwanhausser, of Buffalo, N. Y., vice-president, Worthington Pump and Machinery Corporation, has been elected to the corporation's board of directors, filling a vacancy created by the death of Edward T. Fishwick. Mr. Schwanhausser has been a vice-president of the Corporation since 1939, and a member of the Worthington organization since his graduation from

Stevens Institute of Technology in 1915. For 14 years he was connected with the Harrison, N. J. Works, being appointed assistant manager in 1927. In 1929 he was appointed manager of the corporation's Buffalo Works, and was advanced to the position of vice-president in 1939, assuming in addition to general administrative duties, responsibility for directing the corporation's sales of diesel and gas engines. Prominently identified for many years with civic activities, Mr. Schwanhausser served in 1937 and 1938 as president of the Buffalo Chamber of Commerce. He is a trustee of the Buffalo Savings Bank, and a director of Electro-Refractories and Alloys Corporation of Buffalo.

Slee Now Associated with Robinson Clay Products

William C. Slee has been appointed special representative of the Robinson Clay Products Co., Akron, O., with offices at 1862 Mintwood Place, N. W., Washington, D. C.

Riley Appointed Export Manager for Marion

The Marion Steam Shovel Co., Marion, O., has announced the appointment of J. A. Riley, District Manager of its New York office, as export manager. His headquarters will be The Marion Steam Shovel Co., Graybar Bldg., 420 Lexington Ave., New York, N. Y., after May 1. This will supersede the present address which is now in the Chrysler Bldg. Mr. Riley will still remain District Manager.

J. Thomas Hay Dies

One of the pioneer metallurgists in iron and steel, J. Thomas Hay, died April 12 in his home at Canton, Ohio, at the age of 59. Mr. Hay began his career in the research and metallurgical departments of United Steel Co. after graduation in 1901 from Canton High School. When United merged with the Berger Manufacturing Co., to form United Alloy Steel Corporation, Mr. Hay was assigned the job of finding new outlets for a new product which he had helped to develop—Toncan Copper Molybdenum Iron. He continued this work when Central Steel and United Alloy merged to become Central Alloy Steel Corporation, one of the units assembled in 1930 to form Republic Steel Corporation. With Republic, Mr. Hay continued his development of Toncan Iron

When you specify

SCHRAMM

COMPRESSORS



**Design in Construction makes these Compressors the
"Lightweight Champions" of the World**

Without sacrificing an ounce of pressure or a day of hard-hitting useful life Schramm gives you a compressor with a weight saving up to 40%. . . . The straight-in-line vertical cylinders, cast en-bloc—a compact arrangement that makes for streamlining and releases critical materials which are so badly needed in our present crisis.

If you want facts and figures on the complete line-up of Schramm Portable and Stationary Compressors, Write Today for Our Interesting Catalogs—They're FREE.

PORTABLE . STATIONARY . . . DIESEL-GASOLINE . ELECTRIC . . . 20 TO 420 CU. FT.

SCHRAMM, INC., WEST CHESTER, PA.

with particular emphasis on its application for culverts. He was prominent for several years in Toncan Culvert Association activities and served on the A.S.T.M.'s Specification Committee. Because of his early association and experience with alloy steels and metallurgy, Mr. Hay was much in demand as a speaker and writer. He was also well known for his interest in photography, chemistry and stamp-collecting. Many of the photographs of the late President William McKinley were made by Mr. Hay and were given to the McKinley National Memorial Association. Mr. Hay was a life-long resident of Canton, O., and is survived by his widow, Mrs. Mary J. Kauffman and a sister, Mrs. Richard H. Yancey, both of Canton.

Krugler Promoted to Vice-President Taylor-Wharton

George R. Hanks, president of the Taylor-Wharton Iron and Steel Co., the country's oldest steel plant which this year is celebrating its 200th anniversary, has announced the promotion of J. A. Krugler from general sales manager to vice-president in charges of sales and purchases, and the appointment of J. L. Lonergan as superintendent of the company's Easton, Pa., plant. Mr. Krugler, who was educated at the Rensselaer Polytechnic Institute, entered the employ of Taylor-Wharton in 1924 as a sales student and subsequently was assigned to the company's Scranton, Pa., and New York City sales offices. He became general sales manager in 1936. Mr. Lonergan, a graduate of the Baldwinsville, N. Y., high school, was associated with the Morris Machine Works of Baldwinsville from 1902 to 1940. During those years he served as purchasing agent, superintendent, assistant to the vice-president, general manager, and vice-president and general manager. From 1940 until he joined Taylor-Wharton in November, 1941, he was foundry superintendent of the Pomona Pump Co. of Pomona, Calif.

Otton to Handle Important Productive Assignment for Robins

H. Von Thaden, Vice-President of the Robins Conveying Belt Co., Passaic, N. J., has announced that Alfred S. Otton has been relieved of his former duties as advertising manager in order that he may handle important productive assignments in connection with the war work now being done by the company. Mr. Otton will, in addition, be responsible for both the

sales and production end of the Screen Cloth Department at Passaic. John M. Lupton, formerly assistant advertising manager, has been promoted to the position of advertising manager. He will be responsible for all the various functions of that department.

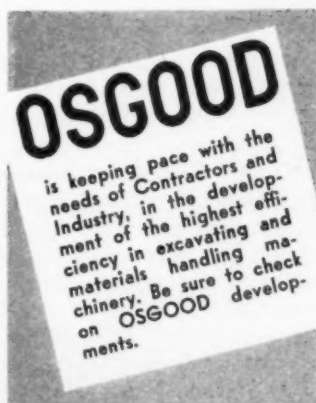
Grant Appointed Vice-President of Young Radiator Co.

Appointment of Robert Grant as vice-president in charge of manufacturing of the Young Radiator Co., Racine, Wis., has been announced by

Fred M. Young, president. He has been associated with the Young organization for the past year as executive in manufacturing. Mr. Grant's new responsibility is the result of further expansion in the war production field by the Young Radiator Co. Mr. Grant was educated at Cornell University and is a member of the Society of Automotive Engineers. He received his early production training as a line superintendent with the Nash motors division of the Nash-Kelvinator corporation. He later filled other important assignments in the production and management field before coming to Young Radiator Co.



A NEW OSGOOD- THE TYPE 70



Another new OSGOOD Air-Control Power Shovel and Crane is now proving itself on many jobs. New features make this machine, on either crawlers or pneumatic tired wheelmount, the best buy of the year. Even though our production schedule is now full—we would like to tell you about the 70—you surely will want one later.

<p>The GENERAL EXCAVATOR CO. Sizes: 1/2 to 2 1/2 Cu. Yd. Diesel - Gas - Electric Associated with THE OSGOOD CO.</p>	<p>The HERCULES COMPANY HERCULES "IRONROLLERS" 6 to 12 Tons Diesel or Gasoline Associated with THE OSGOOD CO.</p>	<p>OSGOOD Sizes: 1/2 to 2 1/2 Cu. Yd. Diesel - Oil - Gas - Electric Crawler & Wheel Mounted SHOVELS DRAGLINES - CRANES THE OSGOOD COMPANY, Marion, Ohio</p>
--	--	--

IN DREDGING OPERATIONS



operates at peak efficiency underwater regardless of materials being dredged.

OWEN special design minimizes wear in places subjected to the severest abrasive action.

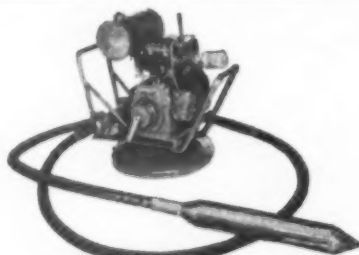
"Alemite" lubricated, sealed underwater bearings and specially shaped counterweights crowd material away from sheaves and cables.

Proper weight distribution facilitates bucket placement when dredging operations are carried out in tidal flow or river currents.

THE OWEN BUCKET COMPANY

6070 BREAKWATER AVE. • CLEVELAND, OHIO

BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.



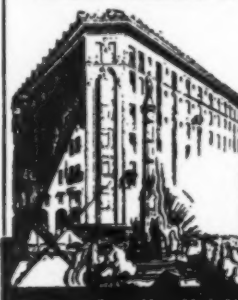
Concrete

VIBRATORS and GRINDERS

Write for Circular on types, sizes and Prices

ELKHART **White Mfg. Co.** INDIANA

BUFFALO'S Best Located Hotel BUT THAT'S NOT ALL!



At Hotel Lafayette you're in the heart of Buffalo's shopping, theatre, and business district. Important, sure. But you also enjoy the prestige and comfort of a truly fine hotel—excellent rooms, restful beds, superb food. Moderate rates: Single, \$2.75 up; double, \$4.50 up. Special rates for 4 or more. Write for Folder E.

Hotel **LAFAYETTE**
K. A. KELLY, MANAGER
BUFFALO, N.Y.

Peters Appointed Vice-President of Truscon

W. V. Peters has been made vice-president and elected a director of the Truscon Steel Co., Youngstown, subsidiary of Republic Steel Corporation. He succeeds Kenneth D. Mann who leaves Truscon to serve in Washington under General Brehon Somervell, Services of Supply Command, U. S. Army. Born in Grand Rapids, Michigan, Mr. Peters received his schooling in Cleveland where he graduated from John Carroll University. His connection with the Truscon Steel Company dates back 19 years to 1923 when he became a member of the company's Cleveland sales force. Subsequently, he was moved to the Detroit sales office, returned in 1930 to Cleveland as district manager of sales, and then transferred to Youngstown as manager of sales of the company's Steel Window Division. In 1936, Mr. Peters was made assistant general manager of sales and a year later became sales manager, a position he has occupied since. C. B. McCee has been named general manager of sales. After graduating from Georgia Tech with an engineering degree, Mr. McCee joined Truscon on October 1, 1927, as a design engineer. In 1930 he

became district sales manager at Atlanta and on June 1, 1937, was transferred to Dallas in the same capacity. Late in 1938 he went to Youngstown to become sales manager of the Highway Products Division and on June 1, 1940, was promoted to manager of sales, southern area, continuing to serve in that capacity up to his present promotion.

Industrial Advertising Association of New York Elects New Officers

At the annual election of officers held April 13th at the Advertising Club, the members of the Industrial Advertising Association of New York, Inc., selected the following men to head up their organization for the 1942-1943 term:

President—E. Scott Pattison, account executive of the G. M. Basford Advertising Agency, New York. Mr. Pattison was former 1st vice-president of the association.

1st Vice-President—Gordon Tuthill, advertising manager of the Crucible Steel Co. of America, New York. Mr. Tuthill was the organizer of the current Industrial Marketing Course sponsored by the association.

2nd Vice-President—Maurice J.

Phillips, advertising division of the International Nickel Co., Inc., New York. Mr. Phillips was former secretary-treasurer of the association.

Secretary-Treasurer—Bernard Dolan, advertising manager of the Peter A. Frasse & Co., Inc., New York.

Director—W. L. Towne, owner of the W. L. Towne Advertising Agency, New York.

Director—Charles M. Neighbors, advertising manager of Babcock & Wilcox Co., New York, past president of the association.

Director—Ralph F. Duysters, advertising manager of the E. A. Scott Publishing Co., New York, publishers of the "Sheet Metal Worker."

Director—Harold B. Bolander, assistant to the president of Simmons-Boardman Publishing Co., New York.

Link-Belt Elects New Directors at Annual Meeting

At the annual meeting of stockholders of Link-Belt Co. in the company's own executive office, 307 North Michigan Ave., Chicago, Alfred Kauffmann, B. A. Gayman, and J. Reece Lewis were re-elected as directors for the full term of three years. Two new directors were also elected. They are

Clarence Tolan, Jr., president of Dodge Steel Company, Philadelphia, for the full term of three years, to succeed Wellington Wells; and William C. Carter, executive vice-president, Link-Belt Co., Chicago, for a term of two years, to succeed George L. Morehead.

A. D. Dennis Appointed Secretary-Treasurer of LaPlant-Choate

The LaPlant-Choate Manufacturing Co., Inc., of Cedar Rapids, Ia., has announced the appointment of A. D. Dennis as secretary-treasurer. A certified public accountant, Mr. Dennis has for the past six and a half years been an Internal Revenue agent. Previous to that he was with the Bank of America in San Francisco, Calif.

New Case Available for Filing Timken Axle News

The Timken-Detroit Axle Co., Detroit, Mich., has announced a new file case for the convenient filing of its publication Timken Axle News. The case has a capacity of up to twelve issues and is offered free to any Timken Axle News reader sending in a request on his business letterhead.

New Trade Literature

How to Extend Life of Tires.—National distribution of a new booklet emphasizing the need for the strictest conservation of rubber and offering suggestions for motorists on how to extend the life of their tires has been started by The B. F. Goodrich Co. Written by John L. Collyer, B. F. Goodrich president, the booklet is entitled "Will America Have to Jack Up Its 29,000,000 Automobiles?" Collyer proposes extensive rubber conservation should be put into effect in the armed forces; a centralized control for all rubber reserves; a national speed limit for the period of the emergency; limitation of the use of cars to necessary trips; strict regulation of the purchase of used and repaired tires, and careful use of tires and all other rubber goods.

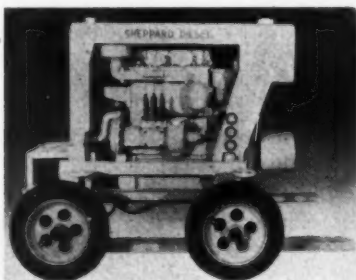
Diesel Engine Units for Construction Uses.—Circulars illustrating and describing its Models 6 and 7 Diesel engine power units have been issued by R. H. Sheppard Co., Hanover, Pa. Model 6 is a 3-cylinder, 4 in. bore, 5 in. stroke, 4-cycle full Diesel rated at 25 H.P. Model 7 is rated at 8 H.P. An important feature of these engines is the fuel injection system. It is one

of the simplest on the market, having only one moving part—the fuel pump plunger. This is stated to make the engines particularly applicable to construction use as it is not necessary to have a special Diesel mechanic to service them.

Kotal.—A booklet describing how Kotal controls the effects of moisture in the construction of asphalt and other bituminous pavements has been issued by Kotal Co., 52 Vanderbilt Ave., New York, N. Y. Numerous illustrations are included, and in addition a diagram is given showing method of introducing materials for Kotal mixers prepared in a continuous mixing plant.

Heavy Duty Brake Blocks.—A new catalog covering brake blocks and liners for trucks, tractors, trailers, and other heavy duty equipment has been announced by the Gatke Corporation. For quick reference the part numbers of Gatke genuine custom-built brake block sets are alphabetically listed by make, year and model. In addition special recommendations give specifications of liners required for each shoe, with suggestions for meeting

**Dependable
Power
ON THE JOB**



SHEPPARD All American DIESELS

R. H. SHEPPARD COMPANY, HANOVER, PA.

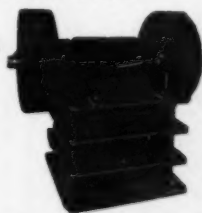
ROCK CRUSHERS

STATIONARY or MOBILE
for Access Road Work



Cross Section View of Pulverizer HAMMER CRUSHERS from 1 ton per hour to 500 tons per hour capacity.

★
CRUSHERS
Built in
many
sizes
to meet
America's
needs
★



All cast steel Roller Bearing JAW CRUSHER. Built stationary or portable, or mobile.

GRUENDLER
(CRUSHERS • PULVERIZERS • GRINDERS)

GRUENDLER CRUSHER & PULVERIZER CO.
2911-23 N. Market St., St. Louis, Mo.

Write for Catalog
No. 601

MICHIGAN mobile SHOVELS

deliver High Yardage at Low Cost



More productive time on the job, and high-speed operation without operator fatigue... Lowest maintenance costs because of advanced design and construction... 25 m. p.h. road speed cuts travel-time between locations. Quickly converts to Crane, Clam, Dragline or Trench Hoe.

Learn how MICHIGAN mobile SHOVELS could help make your jobs pay bigger dividends—write TODAY for Bulletin S.

MICHIGAN American Mobile Shovel-Crane Specialists
MICHIGAN POWER SHOVEL CO.
BENTON HARBOR MICHIGAN

"The nation now, as in 1917, will need the wholesome tonic of recreational travel as one of the greatest maintaining forces of national morale."—Statement by United States Travel Bureau of the U. S. Department of the Interior.

★ ★
WE'RE DOING
Our Part...
 ★ ★

HOTELS of Southern California are doing their part in this great national cause by maintaining normal facilities and operations in every department for the use of Americans seeking mental and physical release from strain and fatigue.

To facilitate the business of Americans, and in the interest of war production, there is augmented service at the great metropolitan hotels of Los Angeles, Hollywood, Long Beach, San Diego and the other large cities of Southern California.

There are no rations of fun at the fine resort hotels located on the desert at Palm Springs; by the sea at Coronado, Carlsbad, Laguna, La Jolla, Santa Catalina, Santa Monica and Santa Barbara; and amid the beauties of Pasadena, Beverly Hills and Riverside. Health

and energy still bubble from the earth at the famous mineral springs resorts.

Golf, tennis, riding, cycling, badminton and a multitude of other sports and recreations are still to be enjoyed every day of the year by the visitor to this sun-blessed land.

Hotel rates in Southern California will continue at pre-war levels. Nowhere is there a greater variety of hotel accommodations to suit every budget and every taste.

In spite of rumors, travel is normal in Southern California. Transportation to and throughout the state is normal, and hotel and resort life is normal.

For further particulars, consult the nearest travel or transportation agent or your automobile club.

Hotels

OF SOUTHERN CALIFORNIA

Room 701, 629 South Hill Street, Los Angeles, California

emergency requirements with multiple coverage sets. The many alternate methods of properly meeting the requirements for seldom-called for part numbers facilitates instant service with minimum stock. A copy of this heavy duty catalog will be sent promptly on request to Gatke Corporation, 228 N La Salle St., Chicago, Ill.

New Center Strip.—Keystone Asphalt Products Co., 43 E. Ohio St., Chicago, has issued a descriptive data sheet on its new center strip for highway and airport runway construction. The strip, employing asphalt and mineral fillers between two layers of asphalt-saturated liners, was developed to release critical steel normally used for longitudinal joints. Specifications and properties of the product are listed.

Material Handling Equipment.—A new 12-page, illustrated folder, No. A-282, is now available showing the complete line of LeTourneau mining and materials-handling tools on some of the largest mining operations throughout the world. Large pictures with descriptive captions on how the job was handled is the theme of the booklet. Modern methods and equipment for increased production is explained. Copies of "Speeding Mining Operations," Form No. A-282, can be obtained from R. G. LeTourneau, Inc., Peoria, Ill.

Stock-Pile Asphalt Paving Mixtures.—A timely Asphalt Construction Series publication, just issued by the Institute, is its "Specification for Stock-Pile Asphalt Paving Mixtures for Making Quick Repairs of Bombed Surfaces." Under the two main divisions of "Materials" and "Preparation and Composition of Mixture" this specification contains eleven sections, as follows: 1. General Description. 2. Mineral Aggregate. 3. Asphaltic Materials. 4. Approval of Materials. 5. Methods of Testing. 6. Paving Plant—Alternate 1. Stationary Plant Mixing. 7. Preparation and Composition of Mixture. 8. Preparation and Composition of Mixture—Alternate 2. Travel Plant Mixing. 9. Preparation and Composition of Mixture—Alternate 3. Road Blade and Drag Mixing. 10. Stock Piling. 11. Measurement and Payment. Single copies of this Specification, designated CP-1, are available without charge upon request to The Asphalt Institute, 801 Second Avenue, New York, N. Y.

34E Paver.—A new catalog descriptive of the 1942 Rex 34E paver has been issued by the Chain Belt Co.,

"BERG" FLEXIBLE SHAFT EQUIPMENT



Model R1-A

Concrete Surfacers, Concrete Vibrators and Hi-Way Surfacers—for concrete construction.

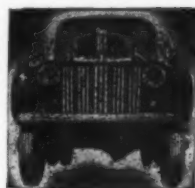
Cleaning, grinding, wire brushing, sanding and polishing equipment—for use on wood and metal surfaces.

Available in electric motor and gasoline engine driven models.

Write Dept. C

**The CONCRETE
SURFACING MACHINERY CO.**
Cincinnati, Ohio

BAD GOING? Here's the Truck that eats it up!



If you need a truck for grading, hauling under the worst conditions, snow-removal or similar services you'll find nothing, anywhere, to equal a Marmion-Herrington All-Wheel-Drive converted Ford. Prices are surprisingly low, and operating costs a revelation in dollar-savings. Write for literature.

MARMION-HERRINGTON CO., Inc.
INDIANAPOLIS, INDIANA, U. S. A.



**VULCAN PAVEMENT AND
CLAY DIGGING TOOLS**

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

VULCAN TOOL MFG. CO.
QUINCY, MASS.

Milwaukee, Wis. This machine is a 2-compartment paver, and has a capacity of 34 cu. ft. of concrete. Incorporated in the operation of this REX paver is the Rex mechanical man which controls charging, discharging and mixing operations automatically. This paver has a new low overall height, extending crawlers and a roomy clear vision operating platform. The engine is mounted away from the skip so that no dirt and dust can harm its operation.

Dozers.—The 1942 combined LeTourneau dozer broadside and poster, Form No. A-278, is now available. The broadside explains the main construction features of the LeTourneau Dozer and pictures it in operation on various types of jobs and under various working conditions. The broadside opens into a 24 in. x 36 in. poster that shows the four types of LeTourneau dozers available and gives condensed specifications on each model. Copies of Form No. A-278 can be obtained from R. G. LeTourneau, Inc., Peoria, Ill.

Stationary Air Compressors.—Schramm, Inc., West Chester, Pa., has issued Catalog 42-S illustrating and describing its line of stationary air compressors. Specifications for various units are included.

Clutch Facings.—A 44-page pictorial review of equipment on which Velvetouch is being used in brakes and clutches has been issued by S. K. Wellman Co., 1381 East 49th St., Cleveland, O. Velvetouch is an all metal friction material consisting of a combination of various powdered metals such as copper, tin, lead, and other powdered materials, compressed, sintered and welded to a solid metal backing for support.

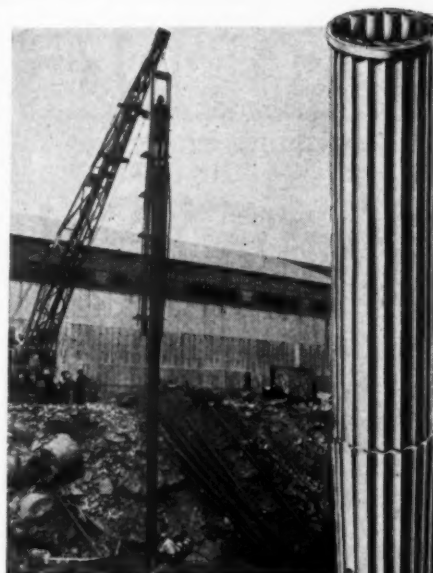
Drills and Drilling Supplies.—The Paris Manufacturing Co., Paris, Ill., has issued 8 bulletins on its Parmanco line of horizontal and vertical drills and drilling supplies. Illustrations and descriptions are given of the equipment for high wall horizontal drilling, a new general vertical drill, a drill for installing water and gas service pipes, a drill for "shooting" coal, and a drill for service work and small main work. The bulletins are enclosed in a useful filing folder.

Truck Patrol Scraper.—A bulletin has been issued by the Root Spring Scraper Co., Kalamazoo, Mich., illustrating and describing its new No. 55 Root truck patrol.

Defense Equipment.—"Air for Defense" is the title of a bulletin issued by Schramm, Inc., West Chester, Pa.

"Tough Job"

**THEY SAID—
but MONOTUBES were
driven 40 ft. from crane!**



● Steel slag and molten metal refuse was scattered all over the site. Yet the sturdy Union Metal Monotubes used for the installation of cast-in-place concrete piles were driven to a depth of 53 feet—and driven with standard leads and hammer operated from a crawler crane on a bank 40 feet away.

Monotube steel casings are so strong and rigid they require no heavy core or mandrel. So it was not necessary to use special driving equipment on this midwestern steel company's "tough" job.

Want to speed up your jobs? Then consider these time-saving advantages of the Monotube Method of Pile Construction...

1. SPEEDY Handling. Monotubes are light in weight for fast handling.
2. SPEEDY Driving. Tapered Monotubes require no core or mandrel, can be driven with any crawler crane equipped with standard leads and hammer.

3. SPEEDY Extension. Use of Extendible Monotubes permits installation of varying pile lengths on the job without delay or waste.

4. SPEEDY Inspection. Hollow, tubular design enables you to inspect casing quickly and thoroughly.

Monotubes come in a gauge, taper, and length to meet load requirements in every soil condition. Our engineers are at your service. Write for Catalog No. 68A.

**THE UNION METAL
MANUFACTURING COMPANY**
CANTON, OHIO

In it are illustrated and described 16 pieces of equipment.

Jaw Crushers.—A bulletin illustrating and describing its Pacific Jaw Crushers has been issued by the Alloy Steel & Metal Co., 1862 East 55th St., Los Angeles, Calif. General dimensions for the 15 in. by 28 in. and the 15 in. by 38 in. jaw crushers are given as well as the specifications. A bulletin also has been issued by the above company on the "flood" lubrication

system. This is a new method of crusher oil circulation on bearings and thrusts as applied exclusively on the 15 in. by 28 in. and the 15 in. by 38 in. sizes of Pacific Jaw Crushers.

Portable Concrete Plant.—The Strayer portable concrete plant is illustrated and described in a circular issued by the Erie Steel Construction Co., Erie, Pa. Illustrations of jobs set up together with details of the plant are given.

Timber Treatment.—A circular describing the Osmose process of treating timber has been issued by the Osmose Wood Preserving Co. of America, Inc., Buffalo, N. Y. This is a wood preservative treatment by natural pressure. It is applicable to any species of fresh cut timber locally obtained. The circular contains general treating instructions together with much information on the various uses of this process.

Road Rollers.—A 16-page catalog has been issued by the Austin-Western Road Machinery Co., Aurora, Ill., describing and illustrating its new tandem rollers, three wheel rollers and Roll-A-Planes. Details of construction are illustrated and described and brief specifications are included.

Hoists and Dump Bodies.—A 12-page catalog has been issued by the Hercules Steel Products Co., Galion, O., illustrating and describing its line of heavy duty hoists and dump bodies. Included in this catalog are details of the center lift speedraumatic hoists, as well as descriptions and illustrations of many different types of bodies used in construction operations.

Construction and Maintenance Equipment.—A new catalog has been issued by Littleford Bros., Inc., 454 E. Pearl St., Cincinnati, O., illustrating and describing its line of black top road maintenance and construction equipment. Illustrations and descrip-

tions are included of 47 different pieces of equipment, ranging from asphalt and tar kettles to water supply tanks.

Crane Under-Carriage.—Six Wheels, Inc., 1572 East 20th, Los Angeles, Calif., has issued a circular illustrating and describing its "Maxi C", 1-man operator crane under-carriage. This carriage is available in capacities of from 5 to 40 tons and speeds up to 17.5 miles per hour.

RELIANCE

CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers	Bins	Drag-Lines
Elevators	Pulverizers	"GAYCO"
Sweepers	Feeders	Centrifugal
Screeners	Spreader	Air Separators
Wash Boxes	Kettles	
	Conveyors	

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.
340 Canada Cement Co., Montreal, Que., Can.

CUT MOWING COSTS



With SILVER KING

Do fast, economical mowing on the level or in the rough with Silver King, the mowing unit that's ENGINEERED for the job. Write for details.

THE FATE-ROOT-HEATH CO.
Plymouth, Ohio

The Favorite Mowing Unit for City,
County and State Highway Departments

HEET-MASTER—SAVES 50%



ON FUEL
HEATS TAR
& ASPHALT
TWICE
AS FAST

Send for
Bulletin No. 196G
HEET-MASTER Kettles for
FREE
on
Contractors

See how this famous kettle INSULATED and heated from the INSIDE, does the work of TWO ordinary kettles of the same capacity. Available in sizes from 55 gals. to 330 gals. on steel, hard rubber and pneumatic tired wheels as well as skid mounted. Can be equipped with power or hand spray and barrel hoist. Also ask for Leaflet 312-G—Paving Tools.

AEROIL BURNER CO., INC.
5711 PARK AVE. WEST NEW YORK, N. J.
Branches: Chicago, San Francisco, Dallas

SNOGO

Don't Compromise
Snow Removal

ELIMINATES dangerous one way bottlenecks. Reduces expensive repeat plowing. Reduces snow damage to roads, and cuts resulting road repair. Plan now for real snow removal next winter.

Klauser Manufacturing Co.
DURHAM, IOWA

MASTER WORKMAN

For Better Roads, put a WORKMAN Machine on the job. 3 sizes:
**THE GENERAL • THE SUPER
THE MASTER**

YORK MODERN CORPORATION
UNADILLA, NEW YORK

When you go to...

MUNICIPAL OPERA IN ST. LOUIS

Stop at this friendly hotel—opposite beautiful Forest Park, near the famed Municipal Opera. Transportation to all parts of city. The Kings-Way provides you with spacious, comfortable rooms at reasonable rates. Air conditioned dining room. VISIT THE CROWN COCKTAIL LOUNGE

H. C. WORLEY, MGR.

KINGS-HIGHWAY AT W. PINE
ROOMS WITH PRIVATE BATH
from \$220 FREE GARAGE

HOTEL

KINGS-WAY

C L E A R I N G H O U S E

DESIGNERS AND DRAFTSMEN

We have openings in important DEFENSE PLANT WORK for men having design or drafting experience in one or more of the following:

CONCRETE DESIGNERS AND CHECKERS

Heavy Foundations, Mill Buildings, Rigid Frame Structures, etc.

STRUCTURAL DESIGNERS

Mill Buildings, Bridges, Trestles, Blast Furnaces, Power Plants, Plate Work, etc.

INDUSTRIAL FURNACE DESIGNERS

Open Hearth, Heat Treating and Annealing, Oil Heating, etc.
Working 56 hours three weeks per month and 44 hours one week per month with time and one-half for work in excess of 40 hours per week.

ARTHUR G. McKEE & CO.

2300 Chester Avenue
Cleveland, Ohio

EQUIPMENT FOR SALE

- 1—Austin-Western 4-44—all wheel drive and steer—9.00 x 24 dual rubber tired tractor.
- 1—Cletrac DDH tractor.
- 1—Caterpillar "60" gasoline tractor.
- 1—Ateco scraper to fit Cat. "60".
- 1—Niagara 2 deck 3' x 8' screen.
- 1—Austin-Western 32" x 14' revolving screen.
- 1—6" Centrifugal pump—2 stage—with 4 cylinder Hercules motor.
- 1—No. 104 Austin Gyratory crusher with back gear.

Subject to prior sale.

TELFORD EQUIPMENT COMPANY
319 East North St., Lansing, Michigan
Tel. 4-3424

SPECIALIZED SERVICES

TIRES REPAIRED

18.00x24 down to wheelbarrow size.
Full line of new and used tires.

WALLACE TIRE SERVICE, Inc.
2329 S. Michigan Ave. Chicago, Ill.

FOR IMMEDIATE RENTAL

1650 Gal. capacity Asphalt or Tar hauling truck—insulated tank—equipped with dual high power burners and dial thermometer GMC truck.
Portable 1000 Watt Kato Light Plant, Wisconsin Motor, 110 A. C.

Leicester Contracting Corporation
Wayne, Penna. Wayne 0925-R

USED EQUIPMENT IN GOOD CONDITION

Subject to Prior Sale

Austin Western Rotary Crusher.
15 x 24 All Steel Blake Type Jaw Crusher.
24 x 18 All Steel 6-7 ton Limestone Pulverizer.
2-3 ton per hour Day Pulverizer.
9 x 16 Reliance All Steel Jaw Crusher.
32" Roller Bearing Disintegrator for 30-40 tons gravel hourly for breaking down and handling clay balls. Also suitable for clay and other products. Practically new.
42" Gruendler Ring Roll Mill, practically new. Capacity from 4-6 tons per hour. For grinding in closed circuit with screen or air separator, from 60-100 mesh.
15 x 36 goose-neck Crusher Frame with axles for engine mounting for pneumatic or steel tire wheels.
Model 101 Type "K" Day Limestone Pulverizer, 2-3 tons capacity.
No. 2 Monster Limestone Pulverizer, 4 to 5 tons per hour.
RAP2 65-70 H.P. LeRoi gasoline engine, factory-rebuilt. In original crate for immediate shipment.
D-13000 Caterpillar Diesel Engine—150 gal. fuel tank.
KOP 4 cylinder Cummins Diesel Engine, 141 H.P. at 800 RPM.
PD-40 International Power Unit.
Sullivan Portable Air Compressor, 220 cubic feet.
No. 6, Style "K" Gates Crusher.
American Type C, 18" x 30" Pulverizer.
Farrell Jaw Crusher, 36" x 18".
No. 1 Jumbo Williams Hammer Mill, 30" x 15".
Continuous Bucket Elevator, belt 18" wide, 105' long.
Continuous Bucket Elevator, belt 18" wide, 100 feet long.
Revolving Screen, 60" diameter x 24' long.
Revolving Screen, 48" diameter x 12' long.
Howe Truck Scale, 1110106, capacity 33000 lb.
Fairbanks Self Contained Ten Ton Capacity Truck Scale.
30 ton 4 Compartment Steel Gruendler Jack Leg Bin.
(2) NEW 10 x 16 Roller Bearing Jaw Crushers.
GRUENDLER CRUSHER & PULV. CO.
2915 N. Market Street, St. Louis, Missouri

CASH PAID FOR TRANSITS AND LEVELS

New & Rebuilt Transits & Levels
Sale or Rent

We Make Guaranteed Repairs to All Makes Economically—Your Old Instrument TRADED IN on Rebuilt or New Instruments, or will purchase for cash.

For Information, Write
for New List

J. H. WEIL & CO.
1325 Cherry St. Philadelphia, Pa.
Curley Representatives

EQUIPMENT FOR SALE

FOR SALE

JAEGER MODEL MP-2, Road Builder
Travel Plant, excellent condition, complete with conveying attachment and extension feed auger, also spreading attachment. 150 H.P. Waukesha gasoline engine. FOB a point in Oklahoma. Address Box 477, Roads and Streets, 330 So. Wells St., Chicago, Ill.

Barber-Greene Model 848 Travel Plant,
excellent used condition, mixer mounted on pneumatic tires. Loader mounted on crawlers. Gasoline power. Located in Kansas. Address Box 478, Roads and Streets, 330 So. Wells St., Chicago, Ill.

ATLAS DIESEL POWER UNIT ON SKIDS, 80 H.P., 4 cylinder, 7x8½, completely overhauled. A real buy. Address Box 479, Roads and Streets, 330 So. Wells St., Chicago, Ill.

FOR RENT

UNIVERSAL 9"x36" Jaw Rock Crusher.
Good used condition. Located in southern Missouri. A bargain. Address Box 480, Roads and Streets, 330 So. Wells St., Chicago, Ill.

TRANSITS and LEVELS



**New or Rebuilt
Sale or Rent**

Headquarters for
REPAIRS—any make.
Factory Service. We will also buy your old instruments or take them in trade.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS 72.

WARREN-KNIGHT CO.

Manufacturers of Sterling Transits and Levels
136 N. 12th St. Philadelphia, Penna.

FOR SALE:

- 30 x 10 Portable CRUSHING PLANT
- 4 x 8 Telmith Vibrating SCREEN
- 1 Ton Cap. ASPHALT PLANT
- 3-800 x 1,000 Gal. DISTRIBUTORS
- 18 in. x 200 ft. BELT CONVEYOR
- 5-RD-4, 7, 8 DIESEL TRACTORS
- ¼ yd. Owen CLAMSHELL
- 10 Ton Tandem ROLLER
- 2-1,000 ft. DIESEL AIR COMPRESSORS
- 30-1½ yd. and 3 yd. DUMP CARS
- 4 ORANGE PEELS—4 to 27 ft.
- 100 H.P. Lambert three drum ELEC. HOIST
- 5 Persons & Cleveland TRENCHERS
- 2-2½ and 3 ton tandem gas ROLLERS

Tidewater Equipment & Machy. Corp.
305 Madison Ave. New York, N. Y.

WANT TO BUY

- 2 Locomotive Cranes
- 2 Whirley Cranes 80' or 125' Boom
- 5 Portable Conveyors 40' to 60'
- 3 1½ to 3 ton Tandem Rollers
- 6 10,000 Gal. Cap. Steel Tanks
- 1 Mile Portable Track

**LEICESTER CONTRACTING
CORPORATION**

305 Madison Ave., New York, N. Y.

WANT TO BUY—Used asphalt distributor, 400 or 500 gallon capacity. Address Box 481, Roads and Streets, 330 So. Wells St., Chicago, Ill.

POSITION WANTED

POSITION WANTED—Superintendent or Foreman, 10 years' experience on General Construction, bridges, culverts, foundations, concrete masonry, clearing, grading, sewer and water systems, re-vertment, cofferdams, pile driving, landscape plantings. Good pusher, age 31, draft classification 3-a. Single, Sober, American Citizen. Will go any place. Box 475, Roads and Streets, 330 So. Wells St., Chicago, Ill.

POSITION WANTED—Thoroughly experienced steam and gas shovel, dragline and crane operator. W. H. Hanna, Pleasant Lake, Indiana.



**Connections You
Can Count on...
To Keep Your Air
Equipment Going!**



**"GJ-BOSS"
GROUND JOINT**

AIR HOSE COUPLINGS

Compact Type, Style XLB-61, ½" and ¾"
Heavy Type, Style XHB-72, ¾" and 1"

Washerless, tight-gripping, quickly connected and disconnected . . . with a reputation for dependable service on all types of pneumatic tool equipment. The soft-to-hard metal seal resulting from the ground joint construction remains leakproof under severest operating conditions.

NOTE: For washer type couplings of otherwise identical design, specify the well-known

"BOSS" Washer Type AIR HOSE COUPLINGS

Compact Type, Style WLB-21, ½" and ¾"
Heavy Type, Style WHB-32, ¾" and 1"

Carried in Stock by Leading
Rubber Manufacturers and Jobbers

**DIXON
VALVE & COUPLING CO.**

Main Office and Factory:
Philadelphia, Pa.

Branches:

Chicago • Birmingham • Los Angeles • Houston

INDEX TO ADVERTISERS

The Dash (—) Indicates that the Advertisement Does Not Appear in This Issue

A		L	
*Adams Company, J. D.	Second Cover	*La Crosse Trailer & Equipment Co.	—
*Aeroll Burner Co., Inc.	82	Lafayette Hotel	78
Allis-Chalmers Tractor Division	13	Leicester Contracting Corp.	83
Alloy Steel & Metals Co.	65	Le Tourneau, Inc., R. G.	6
American Bridge Company	—	Lima Locomotive Works, Inc.	—
American Cable Division	Third Cover	*Littleford Bros.	61
American Chain & Cable Co., Inc.	—		
	Third Cover		
American Creosoting Co.	73	M	
American Cyanamid & Chemical Corp.	—	Macmillan Petroleum Corp.	—
American Steel & Wire Company	59	Marion Steam Shovel Co., The	21
Armco Drainage Products Ass'n.	—	*Marmon-Herrington Company, Inc.	81
Athey Truss Wheel Co.	—	McKee & Co., Arthur G.	83
*Austin-Western Road Mach. Co.	20	*Michigan Power Shovel Co.	79
Auto Gear & Parts Co.	—		
B		N	
*Baker Manufacturing Co., The	9	National Paving Brick Association	—
*Barber-Greene Co.	—	O	
Barrett Company, The	—	Ohio Oil Company, Inc., The	3
*Bethlehem Steel Company	1	*Osgood Company, The	77
Blackhawk Mfg. Co.	—	*Owen Bucket Co., The	78
*Blaw Knox Company	4-5		
Briggs & Stratton Corp.	—	P	
Brooks Equipment and Mfg. Co.	16	Paris Manufacturing Co., Inc.	—
*Buckeye Traction Ditcher Co.	50-51	Pierce Governor Co., The	69
Bucyrus-Erie Co.	10	*Pioneer Engineering Works	—
*Buffalo-Springfield Roller Co.	—	Pitman Publishing Corp.	—
*Burch Corporation, The	70	*Portland Cement Association	—
Byers Machine Co., The	72	Preformed Wire Rope	—
C		R	
Calcium Chloride Association	57	*Reilly Tar & Chemical Corp.	74
*Cleaver Brooks Company	55	Rogers Brothers Corporation	16
Cleveland Rock Drill Co., The	8	Root Spring Scraper Co.	—
Colorado Fuel and Iron Corp.	—	S	
Concrete Surfacing Machinery Co.	81	*Sauerman Bros., Inc.	66
Continental Motors Corp.	—	Schramm, Inc.	76
D		Sheppard Co., R. H.	79
Deere, John	—	Sinclair Refining Co.	53
DeWitt Hotels	16	*Sisalkraft Co., The	75
*Diamond Iron Works, Inc.	—	Standard Oil Company of California	17
Diets Company, R. E.	52	Standard Oil Company (Indiana)	22
Dixon Valve & Coupling Co.	84	Star-Lite Co., The	63
E		T	
*Etnyre & Co., E. D.	63	Telford Equipment Co.	83
F		*Texas Co., The	Back Cover
Fate-Root-Heath Co., The	82	Thew Shovel Co., The	43
*Flexible Road Joint Machine Co.	—	Tidewater Equipment & Machy. Corp.	83
Foot Company, Inc., The	15	Timber Engineering Company, Inc.	47
*Four Wheel Drive Auto Co., The	—	Timken-Detroit Axle Co.	—
G		*Timken Roller Bearing Co.	—
*Gallon Iron Works & Mfg. Co., The	—	Toncan Culvert Mfrs. Ass'n.	11
Gatke Corporation	—	*Tuthill Spring Co.	—
Gemmer Manufacturing Co.	49	U	
*General Excavator Company	77	Union Metal Manufacturing Co., The	81
Gillette Publishing Co.	16-66	United States Steel Corp.	14-59
Gohi Culvert Manufacturers, Inc.	71	Universal Atlas Cement Co.	14
Grace Mfg. Co., W. E.	70	Universal Crane Division	—
*Grundler Crusher & Pulverizer Co.	79-83	*Universal Crusher Co.	—
Gulf Oil Corporation	19	Universal Road Machinery Co.	82
H		V	
Hazard Wire Rope Division	—	Vulcan Tool Mfg. Co.	81
*Heltzel Steel Form & Iron Co.	—	W	
*Hercules Company, The	77	Wallace Tire Service, Inc.	83
Hercules Powder Company	—	Walter Motor Truck Co.	12
Hercules Steel Products Co.	63	Warren Knight Co.	83
Hetherington & Berner, Inc.	64	Well & Co., J. H.	83
Hotels of Southern California	80	*Wellman Engineering Co., The	67
I		Wenzel Tent & Duck Co., H.	—
*International Harvester Company	—	White Mfg. Co.	78
J		Wiley & Sons, Inc., John	—
*Jaeger Machine Co., The	7	*Williams Form Engineering Corp.	45
Jones & Laughlin Steel Corp.	64	*Wisconsin Motor Corp.	—
K		Wood Preserving Division Koppers	—
Kings-Way Hotel	82	Co.	—
Klauer Manufacturing Co.	82	Worthington Pump and Machinery	—
Koehring Company	18	Corp.	—
Koppers Company	—	Y	
		York Modern Corp.	82

*Advertisers with * are represented in the 1942 edition of Powers' Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.

EXCERPT FROM PAGE 62,
Dec. 1941 "NATIONAL
SAFETY NEWS"

Preformed Rope Reduces Injuries

Preformed rope, according to returns from the questionnaire, has been adopted by many companies in order to avoid barbs caused by ends of broken wires. Preformed rope does this in two ways: first, the wire ends do not stick out from the rope when the wire breaks, but continue to lie in position against the rope body; and second, the high resistance of preformed rope to fatigue results in fewer wire breaks developing in a working rope, all other things being equal.

"Buy only preformed rope," cautions the safety engineer of a large automobile company, "since it is safer and cheaper in the long run." The safety officer of a federal government agency says, "There is far more likelihood of workers receiving puncture injuries while handling non-preformed rope than from the preformed type." A metal mine reports that their injury rate and compensation costs due to hand injuries from handling slusher ropes dropped to almost zero when they changed to preformed rope, and two other mines corroborated this report from their own experience. A rubber company says, "We definitely favor preformed rope." Other companies report similar experience.

61% of all Safety Directors

Say-

"Use *Preformed*
Wire Rope to
Reduce Accidents"

AMERICAN CABLE TRU-LAY *Preformed*

When asked, in a survey, how to reduce accidents to workmen handling wire rope, 61% of all Safety Directors said: "Use *Preformed Wire Rope*." American Cable TRU-LAY **PREFORMED WIRE ROPE** means steadier machine operation and greater production. All American Cable ropes made of Improved Plow Steel are identified by the Emerald Strand.

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa. • Atlanta • Chicago • Denver
Detroit • Houston • Los Angeles • New York
Philadelphia • Pittsburgh • San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT



ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Plan tomorrow's Highway program today



Old macadam roads like this one are hard on tires and cars



But they provide an excellent base for a new TEXACO Asphalt surface



Kelley & Meyer resurfaced 27 miles of macadam roads in Mahoning County, O., with TEXACO

27-mile resurfacing project
of Mahoning County, O.,
offers helpful suggestion

To wage a successful "all out" war, even such a normally important activity as highway building must be curtailed. That's true.

But, while actual work on our highways is under temporary curtailment, there should be no let-up in laying plans for future road programs.

To the highway official who is planning tomorrow's road program today, a project completed last year in Mahoning County, O., offers a helpful suggestion —

Mahoning County had 27 miles of macadam roads—old, narrow and rough—on which maintenance had become excessive. Unsatisfactory as a surface, the old macadam provided an excellent base. So the county resurfaced the entire mileage with a plant-mixed TEXACO Asphalt top. Moderate in cost, this resilient TEXACO pavement will serve fairly heavy traffic for years with very little upkeep.

Plan now to salvage your own old macadam roads as Mahoning County did — with TEXACO Asphalt.



THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd St., New York City
Boston Philadelphia Richmond Chicago Jacksonville Houston

TEXACO ASPHALT